# OUT OF THE ORDINARY
## The materiality of the south-east Scottish Iron Age

Mhairi Louise MAXWELL

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# Abstract

A materiality approach is developed in this thesis in order to understand social-material relationships during the south-east Scottish Iron Age. The focus is on everyday objects, traditionally lesser studied in terms of cosmological value, made of bone and antler, stone, clay/pottery and metal (copper alloy and iron) from the Broxmouth Hillfort assemblage and other excavated Iron Age sites in East Lothian. This study sets out to move away from typology to examine the connections between these materials through their sourcing, affordances (signative and pragmatic), design, manufacture, use and deposition. In addition to the archaeological evidence, a range of analytical methods are employed; including laser scanning confocal microscopy, raman spectroscopy, and residue and isotopic analysis.

It becomes evident that the materials studied, despite their predominantly local availability, were invested with meaning in appropriation, making, and were deliberately curated and maintained in use, assembling rich personal biographies. Identities were tied up with making, using and depositing of materials in turn embodying beliefs of fertility, renewal and productivity which were central to Iron Age cosmology, continuing into the Roman Iron Age. These results contribute to our understanding of the construction and practice of society in the Iron Age of Britain, with implications for how we may design our own 21st Century material worlds. It is proposed that social relations in the Iron Age of south-east Scotland were heterarchical.

Keywords:

Artefacts, Iron Age, Materiality, Biography, Cosmology, Everyday, Identity, Analytical Science, Sustainability.

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I am indebted to the original Broxmouth team lead by Peter Hill 1977-95, without whom the opportunity to work on this rich archive would not have been possible. In particular, throughout my CDA I have referred to the original work on the artefact assemblage conducted by Hilary Cool, which has been a great source of inspiration.

The Broxmouth Hillfort Project 2008-2012 team has involved many individuals, all of whom have been an unrelenting source of support and encouragement. I would like to thank all who have been part of the team at Bradford University, directed by Professor Ian Armit, and managed by Dr Jo McKenzie. Many thanks are owed to Rachael Kershaw who provided advice and training on illustration, and project material for the thesis. This thesis was also fueled by the mutual support, motivation and many cups of tea shared with fellow Broxmouth CDA students Lindsey Büster and Rachael Reader.

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In March and May 2010 I participated in the Design Anthropology PhD Course run by the Anthropology Department at the University of Aberdeen and the Sønderborg Participatory Innovation Research Center at the University of Southern Denmark. This has influenced my thinking and I am grateful for all who took part, and to Professor Tim Ingold, Professor James Leach and Dr Wendy Gunn for organising the course.

Additionally, explorations of materiality lead me to experiment with pottery and stone carving, giving me an invaluable sensitive appreciation of materials. Many thanks are owed to Graham Taylor and the Brigantium Archaeological Reconstruction Centre for a fantastic, enjoyable prehistoric pottery course. I very much enjoyed taking part in workshops at The West Riding Stonecarving Association, Halifax Yorkshire.

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## Appendices

## Figures, tables and boxes

# Preface

The following body of research has been conducted as part of a Collaborative Doctoral Award, funded by the Arts and Humanities Research Council and Historic Scotland, tied to the Broxmouth Hillfort Project directed by Professor Ian Armit and managed by Dr Jo McKenzie at the University of Bradford. My doctoral contribution was supervised by Professor Ian Armit, Dr Jo McKenzie and my CDA by Dr Noel Fojut (external supervisor from Historic Scotland). There were three CDA students working on the Broxmouth Hillfort Project studying different aspects of the archive; material culture (M Maxwell), the settlement and architectural evidence (L Büster), and the hillfort within the landscape (R Reader). Lindsey Büster's thesis title is 'Inhabiting Broxmouth: Biographies of a Scottish Iron Age Settlement', and Rachael Reader's title is 'Over the Ditch and Far Away: Investigating Broxmouth and the Later Prehistoric Landscape of south-east Scotland'.

Broxmouth was excavated in three seasons between 1977-78 by a team led by Peter Hill (Hill 1982, 1995) as the result of a threat of quarrying. The hillfort has since been quarried out by a cement works. The site never reached full publication, and from 2008-12 the team at Bradford have been researching the extensive archive, the results which will be published in a multi-authored monograph (Armit and McKenzie in prep. 2013). This author's role as part of the Broxmouth Project team has been to conduct concordances on the material assemblage housed in the National Museum of Scotland (NMS), liaise with finds specialists and assist with the dating strategy, finds cataloguing, finds illustration and publication (Maxwell in prep. 2013, included in Appendix 10), in addition to conducting original research. In practice, work conducted for the project had a strong influence on the research presented here. Broxmouth's well dated and contextualised assemblage for the first time supports a regional framework of analysis for the development of material culture in the south-east Scottish Iron Age, while the experience of working with Broxmouth's rich archive of everyday materials has strongly informed the materiality approach taken here.

# Chapter 1 Introduction

Broxmouth was located two and half kilometres south-east from modern day Dunbar and approximately 600 metres from the East Lothian coastline at White Sands. The excavation results show evidence for continual activity from the 8th century BC to the 3rd century AD (Armit and McKenzie in prep. 2013). To the north of the site there is a small cemetery representing a selective group from the Broxmouth population of 10 individuals, all remarkably closely radiocarbon dated to within the margin of 280 - 70 cal BC (at 2-sigma) (Hamilton et al in prep. 2013).

The excavations at Broxmouth remain the most complete of a hillfort in southern Scotland, producing evidence for multiple ramparts which underwent a complex history of elaboration and abandonment throughout the site's history. Importantly, the evidence for continual activity over 900 years at Broxmouth for the first time has allowed us to examine developments of an artefactual assemblage over a broad span of time (Maxwell in prep. 2013). Notably, from south-east Scotland Traprain Law has an exceptionally large and varied assemblage (approximately 2,000 objects recovered to date from Late Bronze Age and Iron Age date), while Broxmouth has the second largest assemblage (over 1000 recovered objects from Iron Age contexts) but is presumed to be more typical of the region in the agricultural, subsistence and craft activities it represents. However, there is not evidence to support continual occupation of Traprain. Broxmouth therefore makes an important contribution for understanding the chronology of the south-east Scottish Iron Age and provides a framework for understanding developments in human-material relations. For these reasons and having gained first hand experience of the whole assemblage, Broxmouth naturally became the focus of this study. In order to contextualise Broxmouth, other Iron Age excavated site assemblages from East Lothian were examined, including the unpublished site of Newmains and approximately one third of the assemblage from Traprain Law. All the 34 excavated south-east Scottish sites referred to in this study are listed in Appendix 1 and the excavated sites which form the focus of this study from East Lothian are shown on figure 1, of which the artefact assemblages from 14 sites were examined first hand by this author.

Approximately one third of these sites from East Lothian were excavated in the first half of the 20th Century, meaning that only basic contextual information was recorded, if at all. For example, the numerous excavations carried out by Curle and Cree (Curle and Cree 1916; Cree 1923; Cree 1924; Cree and Curle 1922; Curle 1920) at Traprain Law were conducted using unspecific excavation methodologies which make it very difficult to match artefacts to context and phases of activity. The 1977-78 excavations at Broxmouth was in comparison very well recorded. A single context recording system was employed in which codes were assigned to features, and within these features numbers were assigned to layers of activity (for example, to the various infills of a pit). Artefacts at Broxmouth were recorded to feature but under half of all artefacts were given spatial co-ordinates at Broxmouth. This has made it difficult in some cases to assign artefacts to specific episodes of activity but has not affected their general context information and phasing. The opportunity to re-examine Broxmouth's assemblage has re-emphasised its importance for the region in order to understand developments in material culture over the longue durée of the Iron Age.

1 Broxmouth Hillfort
2 Archerfield
3 Biel Water
4 Craig's Quarry
5 Dryburn Bridge
6 East Bearford
7 Edgerston
8 Eweford Cottages
9 Fishers Road E. & W.
10 Foster Law
11 Ghegan Rock
12 Gilmerton House
13 Harperdean
14 Knowes
15 Muirfield
16 Newmains
17 North Berwick Law
18 Phantassie
19 Pincod
20 Prestonpans
21 Rhodes Links
22 St. Baldred's Cave
23 St. Germains
24 South Belton
25 Traprain Law
26 Whittinghame Tower

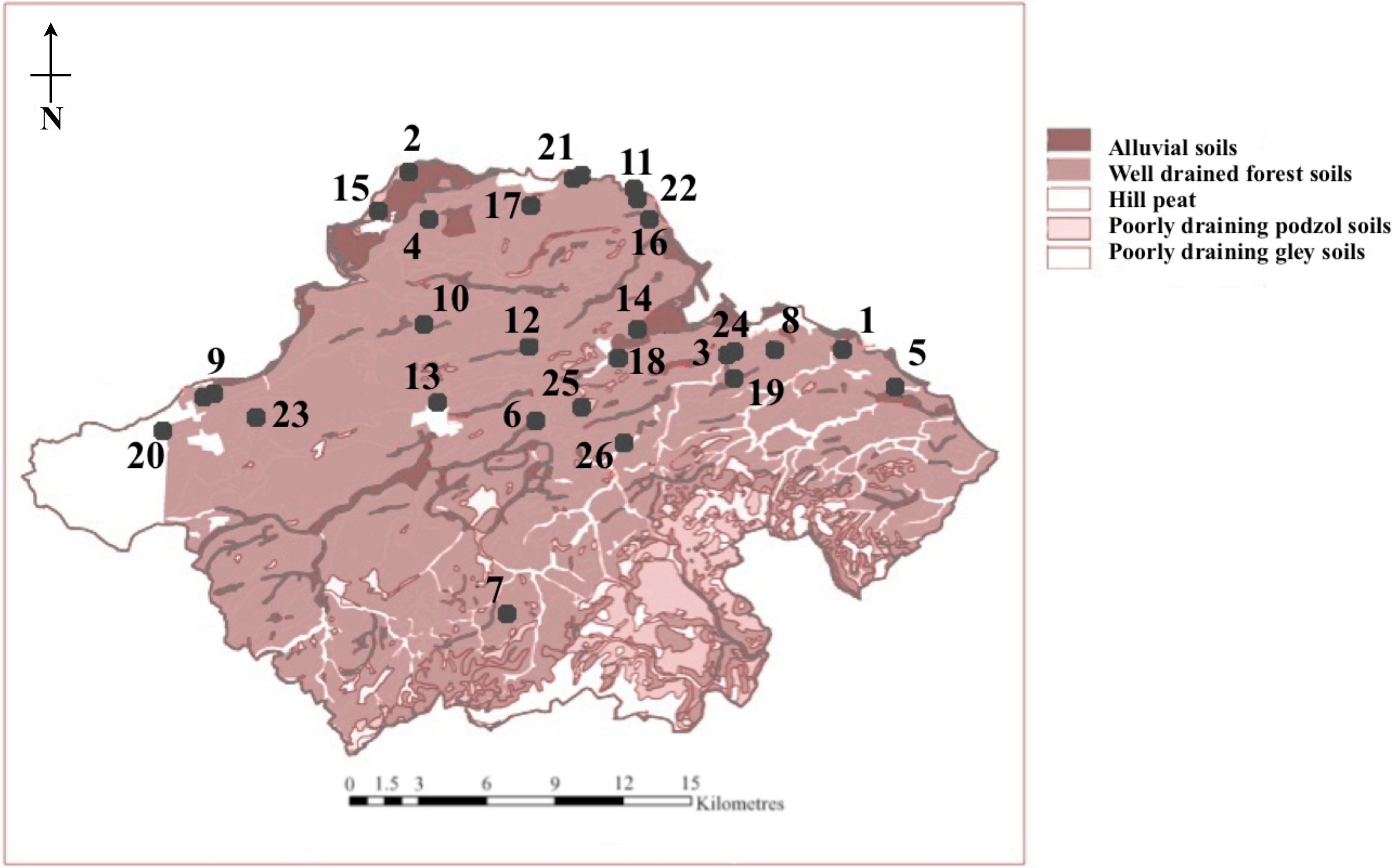



**Fig.1:** All excavated sites of Iron Age date in East Lothian (also listed in Appendix 1), over a soil map. These are the main sites referred to in the text. The majority of sites are located on or adjacent to the good agricultural well drained soils of the East Lothian plain, North Berwick Law and Traprain Law are situated on high rising volcanic plugs. (Map: R Reader and M Maxwell).

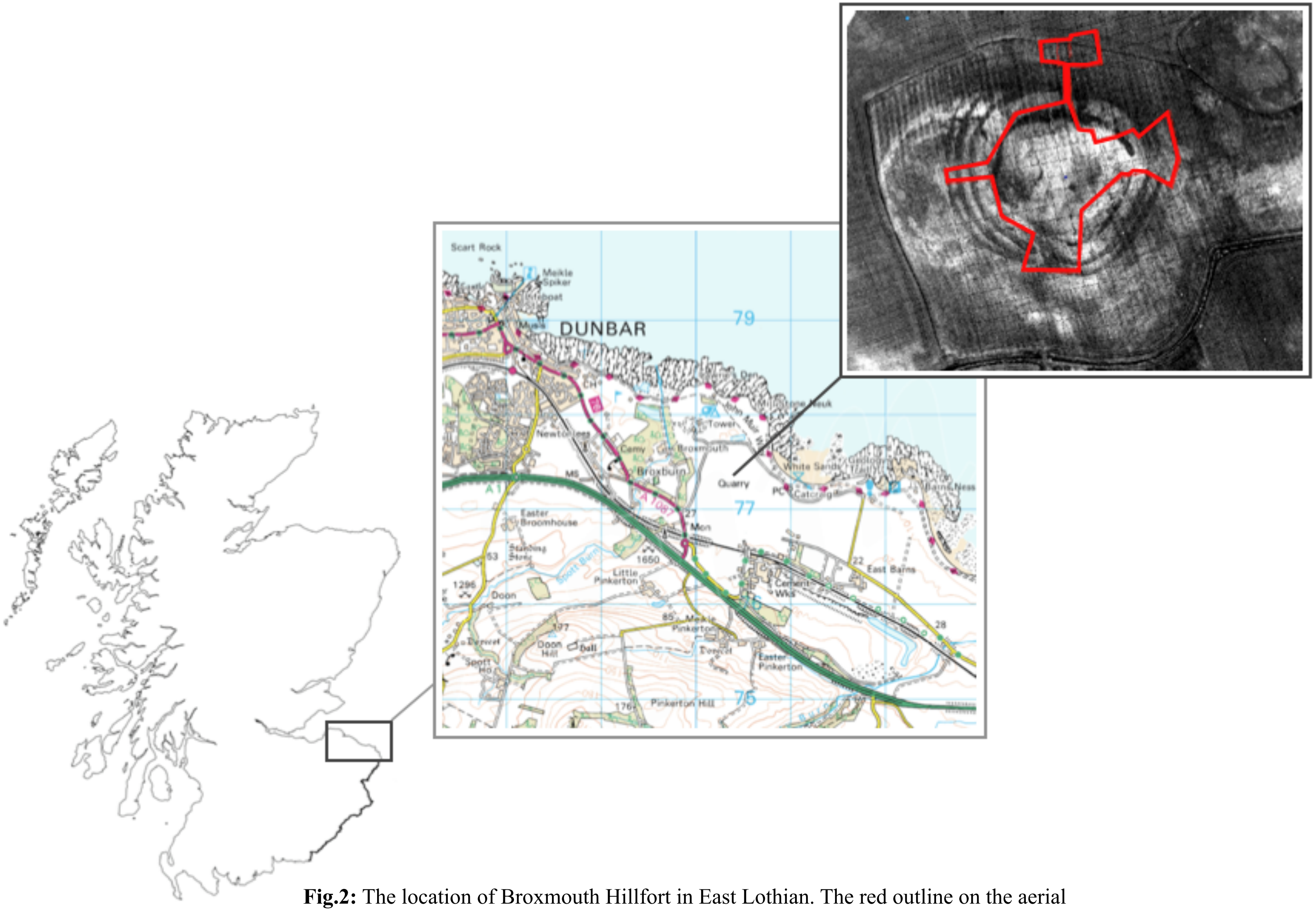



**Fig.2:** The location of Broxmouth Hillfort in East Lothian. The red outline on the aerial photograph taken c.1955 shows the extent of the 1977-78 excavations. (Ordnance Survey Map copyright and Broxmouth Hillfort Project 2008-2013)

## 1.1 Aims and research questions

The perception of an undiagnostic and slow development of material culture over the majority of the Scottish Iron Age has lead to its academic neglect in terms of its social significance (Chapter 2). Until we examine the biographies of native and Roman materials and their depositional contexts in more detail, it is difficult to understand their social value in the Scottish Iron Age. This has encouraged me to take an innovative materiality approach (Chapter 3) for understanding Iron Age society and identities at Broxmouth and the other excavated assemblages in East Lothian, not based on artefact typologies and the visibility of Roman materials, but on biographies of human-material relationships.

The materiality approach taken examines the biographies of worked bone and antler, worked stone, pottery (late prehistoric and Roman) and metal (copper-alloy and iron), asking four predominant research questions:

1. What materials were appropriated and were they locally or non-locally available?

2. How were these materials appropriated, used, treated and engaged with at Broxmouth?

3. How were materials valued at Broxmouth throughout their biographies (perhaps interchangeably) as pragmatic and/or signative?

4. Were there any developments in how materials were engaged with and valued at different sites and/or over time?

## 1.2 Objectives and approach

1. To apply and test an explicit materiality approach in the archaeological interpretation of past identity construction and social relations. *Approach:* A materiality approach is concerned with constructions of identities and understanding the engagements between things and people, where chosen materials intentionally and unintentionally shape and afford practices.

2. To re-assess the current interpretative approaches adopted in Iron Age material cultural studies which are motivated by static typologies and material category hierarchies which are visually determined on final products or upon an idea of an archetype. *Approach:* This will be done by focusing on the associations and disassociations between materials, not based on a belief of innate material or symbolic value. Rather, value is contextually afforded by the adoption of particular materials, their mutable substances and their emergent properties.

3. To overcome a presence/absence focus in Iron Age material culture studies. *Approach:* This will be done by examining the life biographies of artefacts; material appropriation and sourcing, affordances, use-wear studies, and depositional context.

## 1.3 Thesis structure

Chapter 2 will review material culture studies in south-east Scotland, which have been overshadowed by settlement studies and underlain by culture-historical and systems theory models of envisioning the past, spurred on by dominant ideas of type. The case for a reflexive, flexible, engaged, integrated, haptic and biographically motivated study of materials at Iron Age Broxmouth and beyond, becomes clear once we reflect on current Iron Age research carried out in south-east Scotland.

Chapter 3 will then outline the methodological and theoretical approach taken. Ideas of agency, biography, the signative and pragmatic, and affordances (perceived and exploited) will be discussed. The specific methodology taken in this thesis which employs analytical techniques with a biographical approach to examine human-material relations will then be introduced.

Chapters 4 to 7 deal with each material category of worked bone and antler, worked stone, pottery (late prehistoric and Roman) and metal (copper-alloy and iron). This structure is not meant to separate or isolate each material category and when appropriate important links between materials will be made.

Chapter 8 will bring together all the material categories examined thematically to discuss the findings from chapters 4 to 7. The results lead to a review of how we understand social relations throughout the Iron Age. The value of everyday and locally available materials, issues of identity and dynamic social relations throughout the Iron Age, become evident.

# Chapter 2 Literature Review

The Iron Age of south-east Scotland has been the subject of intermittent research and has seen a recent surge in publication. Recent publications are, in the main, the result of commercial or rescue excavations (e.g. Lelong and MacGregor 2008), whilst previously many sites were published in the late nineteenth or first half of the twentieth century. Broxmouth itself never reached a full publication (an interim report was published by Peter Hill in 1982 and a full draft produced (Hill 1995)). South-east Scotland's archaeological record has as a result been noted to be incomplete and under-explored (Hingley 1992: 26). For too long southern Scotland has been considered as archaeologically impoverished (e.g. Harding 2004: 81) leading to suppressed interpretations, only to perpetuate a Childean vision of the region as peripheral and subjected to models of diffusionism (Childe 1933: 223, see Hanson 2002 and Armit 1999 for a critique of this). As will become clear, and as already voiced by Hunter (2009: 145), there is in fact a reasonable and varied amount of material evidence awaiting sustained analysis (Appendices 1 and 2).

## 2.1 Research background

*Landscape and settlement studies*

In general the focus of British Iron Age studies has remained south of the border and specifically in Scotland on the Atlantic Iron Age. In south-east Scotland the elaborately enclosed sites, such as Hownam Rings, Traprain Law and Eildon Hill North, presently dominate our understanding of the Iron Age (this has been criticised by Armit 1999; Hill 1987, Haselgrove and McCullagh 2000: 188). Other recent publications are helping to rectify the bias which has been created by deducing patterns from a very few dominating sites. The Traprain Law Environs Project (Haselgrove 2009) includes the excavation and analysis of five such sites (Whittinghame, Standingstone, Knowes, Foster Law and East Bearford), whilst the recent excavation of two coastal neighbouring enclosure sites Fisher's Road East and West (Haselgrove and McCullagh 2000) is also a welcome contribution. Whilst there does seem to be a tradition of enclosure in south-east Scotland (Armit 1999: 65), at the same time the picture is variable with different sites fulfilling a range of purposes with different histories.

A case in point is the traditional dominance of the Hownam Rings model for understanding the phasing of southern Scottish hillfort sites (Hill 1982; c.f. Armit 1999). Enclosed sites in south-east Scotland were generally understood to have followed a sequence of palisaded→univallate→multivallate→undefended settlement construction (Armit 1999). This sequence was based upon the excavations on Hownam Rings itself which sought to untangle the sequence of southern Scottish hillfort development, within the framework of invasive Iron Age A and B cultures from the south (Piggott 1948). Excavations at Hayhope Knowe (Piggott 1949), Bonchester Hill (Piggott 1950) and Green Knowe (Feachem 1961) supported the basic sequence (though Green Knowe added an earlier phase of unenclosed settlement) and it was assumed that other partially excavated or un-excavated sites would follow suit. The direct application of the Hownam model is based on the assumption that all sites in southern Scotland were subjected to invading cultures in periods of intermittent military strife. Re-dating of the Hownam sequence through material culture sequences led to attempts to define a Hownam culture emerging from a 'long-established regional population group' from c. 800/700 uncal BC to c.uncal AD 100 (MacKie 1969: 21). The Hownam culture was characterised using palisaded sites which occupied the Tyne-Forth region, all with a general lack of pottery and artefacts (MacKie 1969: 20-22). This catch-all assumption remained untested until the excavations at Broxmouth and Dryburn Bridge challenged the Hownam Rings model in the late 1970s (Armit 1999).

Armit (1999) is clear that the Hownam model cannot be applied uncritically to south-east Scotland, especially when considering a region which extends north of the Firth of Forth. Variety and regionality in Iron Age settlement patterns and site phasings are now recognised throughout Fife, Angus and lowland Perthshire. For example there is the excavated open settlement at Douglasmuir in Angus, which has at least six probable ring-ditch houses amongst other post-hole structures (Kendrick 1995: illus.10). At the open site of Ironshills, Angus, there are three round houses and associated rectangular structures thought to be granaries (Pollock 1997). Such permanently unenclosed settlements and the presence of rectangular structures are relatively lacking south of the Firth of Forth, although a range of structures (some sub-rectangular) can be found at Dryburn Bridge, Innerwick, East Lothian (Dunwell 2007). The excavated Iron Age settlements at St Germains, East Lothian were not always enclosed throughout their history, but instead show a complicated history of open, enclosure and elaborate enclosure (Alexander and Watkins 1998). Broxmouth too has a complex history of univallate, bivallate ditch construction and periods of decaying ramparts, but evidence for continuous occupation of the settlement (Armit and McKenzie in prep. 2013). Additionally Late Bronze Age radiocarbon dates taken from the lowest and highest levels from a series of test pits and small area excavations by Armit, Dunwell and Hunter (forthcoming) at Traprain Law across the summit of the site, east of Curle and Cree's excavations (1914-1923), are so far suggesting an apparent lengthy abandonment from the Early Iron Age through to the Roman Iron Age suggesting a change in the use of this site during this period. The possibility for the non-continuous, changing nature and repeated utilisation and abandonment of sites is becoming more apparent.

We need to overcome broad models of diffusionism based on settlement hierarchies and instead consider the complex interactions expressed in a variety of settlement layouts and developments, and material culture; the latter of which has not been the focus of studies in south-east Scotland. The complex relationship between the local and the regional is mirrored in the adopted materialities of south-east Scotland. The widespread adoption of the rotary quern and La Tène metalwork encourages an idea of cohesion, though differences in deposition highlight local practices. Massive metalwork is a restricted tradition linked to north-east Scotland in the Late Iron Age (Hunter 2006), though a regional response to the burgeoning tradition of metal working across Britain at this time. Examining local practices through material culture is perhaps the best starting point since it does not rely upon funding more excavation, especially if backlog projects are considered, whilst it overcomes the site hierarchy bias.

### *Culture-History*

Persisting ideas of type and cultural-packages have left lasting impressions on Iron Age material culture studies. Hawkes' (1931 and 1959) worked within a cultural-historical framework to outline the A, B, C model with the purpose of establishing a relative chronology. A, B, C were a series of cultural entities: Iron Age A was the first movement of Hallstatt 'Celtic' people from central Europe, who brought with them sophisticated iron working technology and hillfort architecture. Iron Age B and C were


**Fig.3:** Piggott's distribution maps showing the distribution of type fossils taken to indicate the extent of Iron Age B influence (Piggott 1950: 130).

subsequent 'Celtic' La Tène invasion events, the latter representing the Belgae from Gaul, bringing each time their own set of material culture, industry and architecture (ibid.). These were geographically defined into provinces (not all of which are listed here) but clearly reflected in the All Cannings Cross Iron Age A culture, Glastonbury Iron Age B culture, the Arras culture of West Yorkshire and Iron Age C culture confined to southern England (Childe 1935: 222-258). Culture-history was epitomised by Childe (1935, 1952) and later Hodson (1964) in British Iron Age studies.

Into Scotland, Childe established three main cultural movements; firstly the 'Abernethy complex' who were invaders landing on the eastern coasts of Scotland (1935: 231) bringing with them La Tène brooches, ring-headed pins, rings and bulbous spear-heads (ibid.: 236). Secondly the 'Castle complex', a coastwise movement from the south-west (with Glastonbury as the type site) northwards towards the Atlantic, traced by the presence of weaving implements (ibid.: 239) and architectural similarities to Cornish forts (ibid.: 238); and thirdly the immigration of La Tène culture (epitomized by chariot gear, La Tène and boss art styles and particular forms of ring-headed pins) from the south into lowland Scotland, from the Arras group occupying east Yorkshire (ibid.: 222, 228, 233, 249, 252 -253). This approach was applied to define zones for types of elaborate metalwork by Stuart Piggott (1950). This epoch epitomises the period in archaeological thought when material = culture.

This understanding the Iron Age of Britain simply in terms of Childean invasionist events and the A, B, C model was subsequently critiqued as being ignorant of local and native British developments (Hodson 1964: 100), as witnessed in the insular curation of assemblages. It was argued that a British Hallstatt C type of assemblage (supposedly representative of an influx of Hallstatt C adventurers) would not 'pass muster as a Hallstatt C assemblage on the continent' (ibid.:100). Instead Hodson introduced the Woodbury culture to account for local British developments from their roots in the Bronze Age. The Woodbury culture, named after the type-site of Little Woodbury (Bersu 1940), refers to a diachronic set of cultures 'fundamentally apart from any Hallstatt or La Tène group on the continent' (Hodson 1964: 104) which share three broad characteristics or type-fossils: round-houses, bone or antler weaving combs and bronze or iron ring-headed pins (Hodson 1964). These cultures were thought to be essentially native to Britain with trends continuing in architecture, material culture and treatment of the dead (lack of inhumation burial being a negative type-fossil) from the Bronze Age (Hodson 1964).

On the other hand, Childe's ideas and the A, B, C model (Hawkes 1959) persisted and influenced the Piggotts who dominated the study and excavation of Scottish Iron Age material at this time. The presence of ornamental metalwork was understood to be evidence of direct contact with Iron Age B cultures at Braidwood (Piggott, S 1958), Craigs Quarry (ibid.), Bonchester Hill (Piggott, C 1950) (Figure 3) and Hownam Law (Piggott, S 1948). Stages of material culture in the Atlantic Scottish Iron Age were outlined by MacKie (1965) who hypothesised at least five artefact horizons according to the earliest appearances of culturally diagnostic artefacts, some of which marked the influx of new peoples (ibid.:121); Iron Age A and B were consumed by the Atlantic province to create distinctive 'Atlantic 2nd B' cultures (MacKie 1965: 111). Scotland's native assemblages were considered primitive and everyday with the occasional occurrence of exotic objects gained by elites through external contact with incoming invaders. Elsewhere in Britain insular regional developments, as called for by Hodson (1964), fueled the discipline, the most obvious example being Stevenson (1966) who directly equated movements of people across the whole of Britain with diagnostic metal artefact types based on material, style, form and hoarding practices. Again type-sites and their assemblages, including Abernethy, Bonchester Hill, Traprain Law and Hyndford, characterised regions and were considered as centres from which people and ideas moved out from. Stevenson (ibid.) re-enforced the idea of a peripheral Scotland which was assimilated into Iron Age culture at a slower rate and where any advancements (in culture, knowledge and people) came upwards from the south.

These models of the assimilation and consumption of objects, technologies and ideas from dominant culture groups have since been rejected, though arguably, as applied south of the Scottish border, they do have merits which must not be totally discounted (Collis 2007); such models at least pay greater attention to physical artefacts than processual analysis which instead de-personalises and obscures artefacts as quantifiable and measurable. Inter-connectedness via networks linking people, ideas and technologies are accounted for in culture-history. Indeed, a major criticism of the modern post-processual local perspective is its inwardness at the expense of acknowledging wider engagements (ibid.).

*Materiality and identity*

Armit (1991: 196-200) has outlined the problems of relying on the visibility of certain types of finds for dating developments in the Scottish Iron Age, mainly restricted to the arrival of Roman material in the Late Iron Age which "have tended to be regarded as exotic curios in otherwise mundane cultural assemblages" (ibid: 196). It is little understood how this material has arrived into native hands and how these materials were engaged with, while there is no clear evidence for Roman material in primary contexts of occupation or construction on native sites (ibid.: 196-198). Native material culture is long-lasting over the whole period of the Iron Age and maintained certain traits in their designs, supporting the idea of the continuity of various cultural communities who shared a set of beliefs (ibid.: 200) until the appropriation of Roman material culture, predominantly jewellery and eating and drinking equipment, in the Late Iron Age which is thought to have encouraged new social systems based on the individual rather than the community (Hunter 2007: 15-21).

'Materiality' is used by Hunter (2006, 2007 and 2007a: 289) to mean the expression of identity and status through valued materials, particularly metalwork and worked bone used to create personal ornament. For example the massive armlets of north-east Scotland are interpreted as Late Iron Age power symbols linked to an emerging 'materiality' linked to hierarchical social structure (Hunter 2006). Similarly for Atlantic Scotland, Sharples (2003) writes of the poverty of material culture before the end of the fourth century AD (the beginning of the Late Iron Age in this region), at which point more elaborate items of personal adornment appear. Sharples (ibid.), in agreement with Hunter (2007:15, 2007a: 289), suggests an idea of increasing individuality in the Late

Iron Age when there are more (archaeologically) *visible* personal items in the repertoire; metal and bone pins, metal brooches and glass beads become common. However, if we turn Sharples' argument on its head, increasing personal ornamentation could reflect the loss of individuality at this time sparking a reactionary need to outwardly express belonging.

The idea of the rise of the individual has been linked to a decrease of communal and monumental architecture in the later Iron Age in Atlantic Scotland along with the diminishing quality and investment in the decoration of pottery (Armit 1996: 229-231). The range of motifs in pottery became more restricted and the variety of forms declined sharply before the introduction of plainer assemblages (as at Loch na Berie and Eilean Olabhat, Western Isles) (ibid.: 178-179). Armit argues that in the Early and Middle Iron Age in Atlantic Scotland the focus was on community and that individuals interacted in the private sphere, whereas changes in social relations with Pictish communities in the Late Iron Age encouraged the need for public displays of identity with a focus on the individual and thus the importance of personal ornaments as display of rank in a more mobile and hierarchical society (ibid.: 231). Therefore, it is not that we suddenly get individuals later in the Iron Ages, but rather identities are expressed in new and different ways due to external pressures. However, this supposed advent of public individual expression may be partly explained by a previous lack of inhumation graves in which personal objects are often found (Ehrenreich 1985: 87). There has also been an over-emphasis on deposition as exemplified by Hingley (1990), Hill (1995) and Hunter (1997 and 2001).

Additionally, although lines are increasingly blurred between native and Roman (Eckardt 2005, Hunter 2001 and 2007, Webster 2001), material culture studies are taken by these scholars to denote a stable readable material expression of a culture and not as temporally expressive through biography and performance. There is a need for more attention to specific contextual associations and the use-wear of objects to tackle interactions between wider and more locally specific expressions of developing identities. Further, the academic interest in creolised or bricolage (Brück 2001) identities has remained in the domain of Roman and native interaction (Carr 2007, Hunter 2001, James 2001, Webster 2001). Whilst this period of interaction in the Later Iron Age perhaps requires different modes of archaeological enquiry, we must also recognise the complex interplay and formation of different types of identities prior to the highly visible appearance of 'Roman' material culture.

## 2.2 The treatment of material culture in south-east Scotland

The sites of Traprain Law and Eildon Hill North are both monuments with a wealth of Roman Iron Age material and have therefore dominated the picture of the south-east Scottish Iron Age. Both have been considered as 'sister forts' and as dominant centres of the Votadini tribe in the Roman Iron Age from which exotics and finely crafted objects of Roman manufacture and influence were redistributed to elites throughout the province (Rideout et al 1992: 70). Additionally, both share a chronology of intense occupation in the Late Bronze Age and Roman Iron Age with a hiatus for intense occupation evidence in between. For Traprain Law the quantity of such 'abundant and diverse' Roman metalwork and exotics was questioned by Hill (1987: 89), who instead interpreted the site as an ancestral ritual centre during the Roman period even arguing that there is evidence for a temple on the most prominent aspect of the summit. Hill's statement provoked a reply from Close-Brooks (1987: 92-94) who claimed the 'temple' was more likely to be a modern sheep fold and 'why must the discovery of 140 brooches, pins, etc., seem so extraordinary for such a very large settlement?' (ibid.: 93). Close-Brooks returns to an idea of the site as a production and exchange centre, perhaps to where Romans brought goods to be exchanged with the natives (ibid.: 93-94). The interpretation of Traprain Law as a centre for establishing social relations via the redistribution of exotic materials is supported by recent work and excavation (Armit et al 2002, Armit et al forthcoming, Erdrich et al. 2000, Hunter 2009, Rees and Hunter 2000). However, commentators now favour a substantially domestic interpretation for the site, attesting that there is settlement evidence across the whole summit providing little support for Traprain Law acting as a specialised ceremonial centre.

Other than the study of the exceptional assemblage of Traprain Law, a general focus on settlement studies and site morphology has neglected the role of material culture within southern Scotland. Material culture's role was primarily to equate cultures to site types, and to depict relationships of subjugation and control. Important studies included Curle's (1913, 1932, 1932a) comparanda of Roman finds on native sites, updated by Robertson in 1970, and Macinnes's (1984) study of incoming Roman goods into Scotland thought to have occurred under a system of strict social control. Otherwise, worked stone, worked bone and undecorated pottery were considered as fruitless for this task. We have now moved beyond ideas of material culture as mute props for group identity, but instead accept the role of material culture in forming and expressing multiple fluid identities within and across groups. Rather than mapping the presence or absence of culturally diagnostic artefact types, modern writers and site publications are better at integrating material into interpretation.

Nevertheless, despite a call for material culture studies to be integrated into current research agendas (Haselgrove and McCullagh 2000: 188-189; Haselgrove et al 2001: 14-31; Haselgrove and Moore 2007: 3, 7-8; Hill 1995), analysis and interpretation for southern Scottish material still remains largely in the domain of site-specific reports and is considered explicitly by a few artefact specialists. Haselgrove and Moore (2007: 3 and 7-8), Moore (2007), Loney and Hoane (2005) call instead for an integrated approach towards material culture, which examines artefacts as part of landscape and regional studies, engaged in wider social networks and as integral in the creation of multiple identities.

Material culture - its appropriation, manufacture and deposition- are integral to the stories told of the East Lothian backlog projects of St Germains (Alexander and Watkins 1998), Dryburn Bridge (Dunwell 2007) and excavations at Phantassie, Biel Water and Eweford (Lelong and MacGregor 2008). More attention could, however, be paid to artefactual engagement and use. It is rare for a site report to give complete catalogues and details of the use wear found on objects (excepting Hunter 2009: 140-145). The publication of excavations along the route of the A1 effectively uses material culture to create narratives of identity, but fails in providing comprehensive contextual and descriptive data which surely must be made available for further discussion and analysis which would allow comparisons to be drawn to other sites (Lelong and MacGregor 2008). In the Douglasmuir report the finds are presented as a list in relation to each excavated structure (Kendrick 1995), occasionally with suggestions for their use. Of the

65 pages of report, finds are mentioned and simply described on only three (ibid.). A full catalogue was not even deemed necessary for the publication (though this is accessible in the National Museum of Scotland archive). This approach may be explained by the fact that the Douglasmuir finds were all of coarse stone, common and unyielding, it is generally thought, for interpretation. This is, however, not the case. Rather a range of quern, rubber, polisher and whetstone fragments indicates a variety of activities at this site (the harvesting, processing of grain, cereals or ore, hide working, the use of metal) (ibid.: 58) and if their biographies and contexts throughout the occupation history of the site were given attention they may be seen as more than pragmatic but possibly as chronologically and symbolically important and potentially a rich material culture.

Hunter (2001) has introduced theoretically engaged approaches to the study of Roman and native interaction in Scotland. Nevertheless, it is clear that the Late Iron Age and introduction of Roman material in southern Scotland has been high on the agenda, to the neglect of more supposedly prosaic and mundane objects from the Early and Middle Iron Age. Hunter's (2009) collation and analysis of broad assemblage patterns and variability in a sample of 60 lowland Iron Age sites and the total (to date) of East Lothian's material cultural evidence is an important addition to our knowledge and understanding of the region. A new agenda has been set by Hunter (Hunter 2009: 32) who takes all material present into consideration in order to build up a picture of the activities represented in the region. He demonstrates the potential of examining the basic use-wear of artefacts in order to examine patterns in activities across Iron Age sites, helping to elucidate the interaction between regional and local activities and their various social relationships (Hunter 2009: 143).

Current dominant trends in Iron Age material culture studies, therefore, remain based upon static typologies and material category hierarchies with a focus on materials with 'high symbolic or socio-cultural meaning' as in the case of grave goods of brooches and toilet equipment denoting social status (Eckardt 2005: 141). In 1937 Curwen noted how querns had escaped academic analysis, presumably since they were regarded as objects with little symbolic or socio-cultural meaning. The picture is beginning to change since Curwen's (1937) study of the chronological development of quern forms in Britain during the Iron Age, with arguments about the ritual or pragmatic significance of quern deposition and re-use (Armit 2006, Hingley 1992). Nevertheless, there is a need for a radical and more broadly based re-examination of southern Scotland's Iron Age material culture, which, excepting the odd object of Celtic art or finds of Roman origin, is usually thought of as generic.

# Chapter 3 Theoretical and Methodological Approach

A materiality approach has been taken to study the material culture of the southern Scottish Iron Age to fulfill the aims and objectives in Chapter 1. The two leitmotifs for materiality relied upon in this thesis are:

"The ways in which things are appropriated by us and subsequently materially affect us" (Graves-Brown 2000:1)

and

"the things people make, make people" (Miller 2005: 38).

## 3.1 Theory

The theoretical bedrock upon which the methodology presented here draws upon the work of Gell (1998), Ingold (2007 and 2011), Knappett (2005), Knappett and Malafouris (2008) and Miller (2005). These authors recognise the ontology of things and people and the changing relational contexts in which both are situated. Importantly too, by combining their theories we can reassess the neglect of things in this relational equation to overcome an anthropocentric approach to material culture. It is not necessarily a balanced equation, however; we must be careful to not make things too human (Holbraad 2011: 6).

*Agency*

Whilst perhaps the major difference between things and people are people's ability to think, Gell (1998) nevertheless recognises that creating things constrains our present and future intentions, material and social relationships. One of the most famous of Gell's examples to illustrate this point are the Malangan carvings created in New Ireland (ibid: 223 - 228). These carvings are assemblies of motifs inherited from the ancestors which are created for mortuary ceremonies of important individuals. During these ceremonies the motifs are passed down to selected individuals of the next generation who are chosen by the person who previously earned the right to memorize the images (usually individuals can influence this by donating large amounts of money). Subsequent assemblies of motifs refer to previous transactions of motifs, past and aspired future networks of social relationships. Thus, past Malangan carvings limit the possibilities of future relations. Motifs appear in different combinations according to those who possess the knowledge of motifs and carvings. Therefore, because certain individuals direct the continuation of Malangan motifs, only those in living peoples' memories are available for establishing social relationships in the present. This example emphasises how artefacts are good to think with (not *through* contra Henare et al 2007) as actively influencing intention, i.e. the creation of artefacts effect our experiences in the world. Therefore, things can only exist according to their use in social spheres of engagement (Gell 1998) and cannot be divorced from the human cultural context in which that encounter took place. In this way, objects act as "distributed minds" (Miller 2005: 13).

Miller (2005: 39), on the other hand, illustrates the reverse; that people can be reduced to be object-like. An example of this is the change in the way Trinidadians expressed their identity and social values from being based in kinship relations, towards basing identity in the acquirement of new commercial goods such as cars and clothes (ibid. and Miller 1994). Rather than envisioning this as a decline in the authenticity of relations and a rise of selfish unsustainable individualism, rather Miller argued that in the previous system people were in fact objectified (ibid. and Miller 1994). Hence, instead of blaming failed relations on the unreliability of women it was now blamed on the unreliability of car parts (Miller 2005: 39).

*Flows of materials: context and biography*

The concept of materiality as proposed by Gell (1998) has been criticised for giving things the same type of agency as people (Holbraad 2011: 6 and Miller 2005: 13), whereas Miller (2005) can be criticised for not dealing with where the agency is situated, in things, in people or in-between. In retort Ingold (2007) and Hurcombe (2007) called for a return to the physical properties of materials. However, the materiality concept was misunderstood by Ingold (2007 and 2011:16, 22) and Hurcombe (2007) to mean the way in which things are abstracted within a web of cultural relations as separate from the study of materials which are only ever 'practically

**Fig.4**: A Christmas-tree bauble only makes sense in its cultural context. (photograph: M Maxwell)

experienced' (Ingold 2007: 15, Hurcombe 2007: 521). Rather, the practical and the cultural are both needed for understanding (see discussion on the pragmatic and the signative below), as the example of a Christmas tree bauble demonstrates (Figure 4). This bauble is familiar according to its place within traditional Christmas celebrations, which owe as much to the smell of the pine needles of the tree it decorates, the glitter, and the smell of turkey in the oven. Culture is practically created and experienced; a plastic glittery spherical object makes little sense otherwise.

Ingold's (2007 and 2011) theory of materiality, therefore, is situated in the ecological perspective: materials, humans and artefacts all 'occur' relationally as experienced during the life course. This perspective upsets the human-material balance, freeing all things from the idea of agency. Agency to Ingold is "a magical mind-dust that, sprinkled among its constituents, [which] is supposed to set them physically in motion" (2011: 28). Environment, humans and things are equally important in this ecological approach, since each relies on the other to be alive (Ingold 2011). One example Ingold uses is the creation of a shelf from a plank of wood which involves, other than the wood, the hand and body, a saw, a set square, a pencil and a ledge to lean on (Ingold 2011: 51-62). The hand and body initiates movement and knows how to from previous practical experience, and at the same time the activity of sawing requires the engagement of all the other tools. From then on gestures of the body and hand attune to the inter-related movements of the saw and the plank, stabilized by the ledge. The grain of the wood alters the pace of sawing and then suddenly the plank of wood is detached and the saw is no longer useful (ibid.). Then the plank, once attached to a wall, becomes a shelf upon which things sit. Artefacts are therefore circumstances, or 'flows', which are created through a history of human and material relationships experienced within endless varying alignments of the ingredients which make up the world; open to change, various interpretations and levels of meaning (ibid.). This is a hugely helpful way to think about the world and our place in it.

Appropriation can be used to refer to the initiation of a particular flow of materials involving people (Graves-Brown 2000). It is preferable to 'production', since this term implies the transformation of raw materials which is not necessary. A methodology for studying this understanding of materiality, without a need for the rhetoric of agency (Ingold 2011), in archaeology is therefore needed. This will also include studying material affordances and the biographies of artefacts involved in relational networks of engagements (material, locational and human).

*The signative and the pragmatic*

Knappett (2005 and 2008), similarly to Ingold (2007 and 2011), overcomes the agency dilemma and deals with humans and things relationally. Perception and different levels of meaning are central to Knappett's approach (2005), using the ideas of signative and pragmatic affordances from sociology, semiotics and psychological theory. Affordances are the ways in which an artefact can be experienced according to constraints of environment, appropriation, human physiology and culture (ibid.: 45-58). Pragmatic affordances are defined as practically and tangibly efficient and responsive; whereas signative is defined as emoting conceptual, abstract meaning (Knappett 2005 and 2008, see also Maxwell 2008). Peirce (1868) provides a useful framework for proceeding towards a distinction between how artefacts are perceived and utilised by people as familiar (pragmatic) or discriminated (signative). Peirce's semiotics of iconicity, indexicality and the symbolic is used to come up with a distinction to how things and objects are valued and hence appropriated differently as sensibly and practically experienced, and as conceptually meaningful (ibid. and Knappett 2008). Importantly an artefact can be experienced as both pragmatic and signative simultaneously and differently according to context. A commonly used example to illustrate this is the art of Duchamp and the readymade, where a urinal only becomes art when put in a gallery. Both the pragmatic and the signative are important ideas for understanding how appropriated materials were valued in Iron Age worlds.

*Design: perceived affordances*

These ideas of pragmatic and signative affordances are effectively communicated in contemporary design theory and practice (Fukasawa and Morrison 2007, Lukić and Kātz 2011). The designer Donald Norman provides a refinement in terms and his idea of perceived affordances are followed in this thesis. Importantly Norman distinguishes between Gibsonian affordances and perceived affordances (Norman 2011: 228). Gibson introduced the term affordances to describe how 'the object offers what it does because

**Fig.5:** Here is an example to illustrate the cultural context of perceived affordances. The car on the left is frequently advertised as a family car and one would expect the user to be a responsible driver. The car on the right, however, is associated with young men (or those who wish they still were) and ideas of freedom and irresponsibility. The design of the car on the right only has comfortable space for two people, large air vents and aerodynamic design to satisfy a want for speed. The 'family car' has plenty of space for four individuals, large trunk for storage and chunky safe box design (images: http://images.google.co.uk http://www.Telegraph.co.uk accessed 15/03/2010)

it is what it is' (Gibson 1977: 78). Gibson is concerned with the physical properties of materials at the ecological level; the relationship between environment, materials and bodies (Ingold 2011: 77-79, Knappett 2011: 49). Cows eat grass and so recognise it as fodder, whereas it is not healthy for us to eat grass but we require shelter so recognise its usefulness for thatching. It is clear to Gibson that we will never know all the affordances that a material can offer (Gibson 1977). Pragmatic and/or signative affordances are only *recognised/ perceived* when the need arises for them, an object is only regarded useful if it has served a purpose, like the saw in Ingold's example given above (Ingold 2011: 51-62). Designers "can invent new...perceived affordances" (Norman 1999). Therefore, perceived affordances are designed.

"To the designer, if affordances are not known, then they might as well not exist. In other words, the designer is primarily concerned with *perceived* affordances; the perception is critical. As a result, when designers correctly observed that some people


**Fig.6:** Illustrating the use of signage to compensate for bad design of a door in the Nottingham Contemporary art gallery and swing doors on the campus of the University of Bradford. (after Norman 2011: 229, photographs: M Maxwell)

were having difficulty using a product because they failed to notice the affordance, they would add visible signs of its existence...[by putting] 'an affordance on a product'..." (Norman 2011: 228).

Norman uses the example of 'push' and 'pull' signs on doors as an example of bad design, where the perceived affordance was not obvious and required a written direction to the user (Figure 6). Therefore perceived affordances are the qualities of a material that the designer wishes the user to recognise and experience. Indeed, materials do not have to be transformed to be designed: picking up a stone to use as a burnisher makes you a designer, since the smooth surface of the stone has been chosen/ appropriated as a quality. The surface of the stone is perceived as useful in a culture who makes burnished ware pottery.

*Use: exploited affordances*

Exploited affordances is a term introduced in this thesis. This refers to the actual affordances exploited by the user which survive as traces, incisions and other types of wear, which are not necessarily in agreement with what the original designer had in mind. Recognition of only perceived affordances rejects the possibility for intuitive,

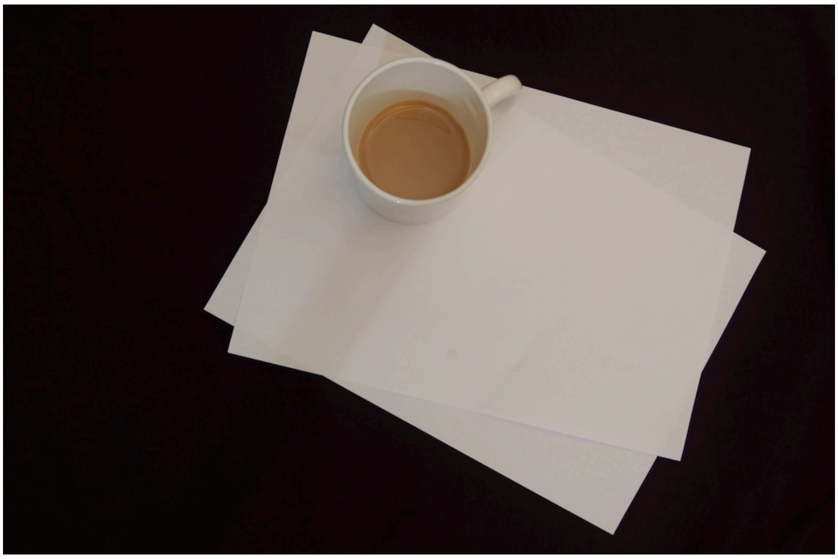


**Fig.7**: A coffee mug can make a good paper weight, illustrating the principle of exploited affordances. (photograph: M Maxwell)

opportunistic or out-of-the-box experimental, creative and unexpected uses of materials and artefacts, which push the constraints or intentionality of the designer(s). For example, a coffee mug acts as a good paper-weight (Figure 7), or a cardboard box as a fun wendy house. An idea of 'emergent properties' is central to the recent branch of participatory design theory (Norman 1988). For example in a study of how a family used everyday objects in their household, Wakkary and Maestri (2007) discovered many resourceful uses of garden chairs as tables, armchairs as coat-hangers, cupboards as ledges to stand on for something out of reach. They argue that design should recognise these 'unremarkable [exploited] affordances' to make objects which are adaptable and open to new uses (ibid.: 171). Participatory design (Schuler and Namioka 2002, Crabtree 1998) focuses on how people actually use things and interact with their environment, in order to better co-operatively design for the future and has been practiced in a variety of everyday contexts including households, engineering work and offices (Blomberg et al 2002, Buchenau and Suri 2000, Buur and Sitorus 2007, Buur and Matthews 2008, Wakkary and Maestri 2007, Yaneva 2009).

All of the above ideas provide a basis for understanding the materiality of the Scottish Iron Age. Archaeology, however, requires specific methods in order to recreate contexts of past human-material engagements from the artefacts themselves.

### 3.2 Object interaction workshops

Six one hour 'object-interaction workshops' were conducted with first year archaeology students in their first week of enrollment at the University of Bradford in order to explore how a range of archaeological worked bone, antler, stone, pottery, metal and other non-archaeological artefacts are understood and engaged with first hand. Students were not assumed to have had prior archaeological knowledge. The workshops were modeled on user-interaction workshops used by designers when creating prototypes. The students were encouraged to handle and play with a chosen selection of objects throughout, whilst completing a questionnaire (Appendix 3) and taking part in two activities; grouping artefacts into categories which they thought were appropriate and secondly creating dynamic movement sketches based on handling the objects. These latter sketches were made using pens or chalk attached to the ends of bamboo sticks so as to remove the control of the wrist and involve the whole movement of the body in the traces left on the paper (Figure 8). However, nearly all students were nervous of handling the objects and many did not despite the freedom to do so. These workshops highlighted that our own culture's understanding of objects relies on visual inspection. This was perhaps a result of having to wear a white coat in a laboratory environment; in


**Fig.8:** Dynamic movement sketch produced by a group of first year archaeology students on one of the 'object interaction workshops'. The marks on the paper are traces of the movements of a spear, a pot, and a TV remote. (sketch various artists, workshop organised by M Maxwell 2010)

our culture learning privileges the brain over the body. Additionally, from the categorisation task numerous possibilities were presented, and there were no exact duplications in groupings. Therefore, these workshops highlighted a need to develop a methodology which broke away from the visual constraints of typology and encouraged a move towards appreciating artefacts hands-on, in various contexts.

The developed methodology will be outlined below, and includes the application of analytical science, experimental work and contextual analysis to understand the design and use of worked bone and antler, worked stone, pottery and metal.

### 3.3 Methodology

My developed methodology for studying Broxmouth and other East Lothian Iron Age artefactual assemblages focused on the investigation of the appropriation of materials, their perceived affordances and their exploited affordances. The perceived affordances of artefacts will be considered by attempting to reconstruct the choices and relations involved in the design of objects. The exploited affordances of artefacts will be considered by examining the traces on object surfaces and contextual evidence of their actual use and deposition.

In this thesis all the small finds codes given in brackets in the text can be linked to their full find description entries listed by site in Appendix 2. The chapters dealing with each material category (worked bone and antler, worked stone, pottery and metal) follow the same structure split into four sections of appropriation, perceived affordances, exploited affordances and deposition:

1. What materials were appropriated at Broxmouth and East Lothian and what were the networks of engagement involved?

This involved source analysis of the materials present in the Broxmouth assemblage. The source analysis considers all possible locations and routes of acquirement in order to estimate the networks of engagements involved, and additionally will consider issues such as seasonal harvesting of materials.

2. What are the perceived affordances of the appropriated materials?

This is primarily an analysis of the design of artefacts for an intended purpose. Importantly design does not only have to refer to modified materials, but can refer to deliberately chosen natural forms and materials. Artefact design limits the functional possibilities of a material. The study of pre-determined functions should not be confused with an attempt to fit artefacts into typologies: standardised and unchanging functional categories are criticised in this thesis. It does, however, attempt to understand the multiple reasons why certain materials were chosen for use, their possible contexts of use and their pre-conceived role in Iron Age society.

In order to not rely on visually assumed object functions based on looks, human-material engagements were explored using analytical techniques (including near infrared Raman spectroscopy and Laser Scanning Confocal Microscopy) and experimental work. Additionally ethnographic literature informed interpretations. Both the pragmatic and the signative attributes of appropriated materials were considered.

3. What were the exploited affordances of these appropriated materials?

By examining the actual exploited qualities we can understand how people understood and manipulated materials in creative ways. Importantly, this third section checks whether exploited affordances complemented the perceived affordances of artefact design discussed in the second section. Sometimes the results are surprising and artefacts are in fact used in unexpected ways.

Exploited affordances are left as use-wear on objects; polishing, smoothing, rubbing or abrasion, scratching, pounding, incision, breakage, and so on. Primarily this analysis was done visually in the laboratory or museum, in some cases using microscopy at x10-x100. In order to understand how pottery was used, Gas Chromatography Mass Spectrometry (GC-MS) was used to analyse visible residues on pottery from four site assemblages.

4. How and where were objects deposited?

The on-site distribution and contextual association of different artefacts will be analysed using contextual information from site reports and the plans and sections from the Broxmouth Hillfort archive. This will illuminate deposition practices.

### 3.3.1 Preservation

The dominant materials represented in the Broxmouth assemblage are worked bone and antler, pottery (late prehistoric and Roman samian), worked stone (including shale and cannel coal) and metal (iron and copper alloy), given in Table 1 by phase. Other materials which are not included in table 1 are the disarticulated human bone fragments found in various phases throughout the sequence, the perforated whale bone disc in Phase 3, the coral bead in Phase 4, and seven Romano-British glass bangles and a piece of Roman bottle glass which are from Phase 6. Due to its siting on an alkaline limestone outcrop, the preservation of Broxmouth's worked bone and antler (n=325) assemblage is remarkable for Scotland and rivals Danebury, Hampshire and assemblages recovered from the Atlantic Iron Age (e.g. Hallén 1994). There are only six other sites in East Lothian with worked bone, of which Ghegan Rock is the only one which has over 20 objects preserved (n=21) (Richardson 1907). Broxmouth also boasts the largest assemblage in southern Scotland of querns including at least 24 saddle quern fragments and 36 rotary querns (in 41 fragments), seven of the latter with decorative pecking or grooves. Other organics are not preserved at Broxmouth, nor indeed in any other south-east Scottish Iron Age material culture assemblage, but there is indirect evidence for their presence at Broxmouth in the activities represented including hide working, textiles and basketry (discussed further in Chapters 4-7), and the copper-alloy fittings which were perhaps attached to wooden containers or leather straps. This is due to the adverse conditions of the notoriously acidic soils of East Lothian. Soil conditions, however, do not seem to affect late prehistoric pottery since the assemblage from Broxmouth of approximately 430 sherds is comparable to Phantassie (n=349 sherds) (MacSween 2008a) and St Germains (n=379 sherds) (Alexander and Watkins 1998: 224-233), both of which are situated on acidic soils.

It is also worth noting that parts of the artefact assemblages from two East Lothian excavated Iron Age sites included in the analysis are now lost. Pottery, worked bone, worked stone and metal artefacts were stolen from the site hut during the excavation of St Germains (Alexander and Watkins 1998: 208). From Dryburn Bridge the later prehistoric pottery (except for a Bronze Age beaker vessel), and many of the coarse stone objects are now missing and could not be located by Dunwell (Dunwell 2007: 4) or myself in the National Museum of Scotland. The finds reports included in the 2007 publication, however, were originally created c.1980 and refer to the objects which were illustrated before going missing (Cool 2007: 73-74, 75-78). Although it is unfortunate that these finds are physically missing these sites are otherwise well published.

### 3.3.2 Phasing and chronology

Even in modern excavations, the contexts in which artefacts are found are rarely directly radiocarbon dated. This has hampered past attempts to refine the development of artefact assemblages through time. As part of the Broxmouth Hillfort Project, the site was subjected to a detailed absolute radiocarbon dating programme (Hamilton et al in prep. 2013 and Appendix 4), meaning that developments over time in the south-east Scottish Iron Age can for the first time be interrogated. All radiocarbon dates quoted in this thesis are at 2 sigma from Hamilton's Bayesian modeling of the sequence of events (Hamilton et al in prep. 2013).

Phase 1 (705 - 455 cal BC) Early Iron Age Settlement:

The earliest recorded feature at Broxmouth is the palisade, in which a late prehistoric pottery fragment was found, and which was later cut by the construction of houses. There is evidence for a structure where there was a possible *in situ* furnace with associated metallurgical material and antler and bone objects. This phase was cut by the

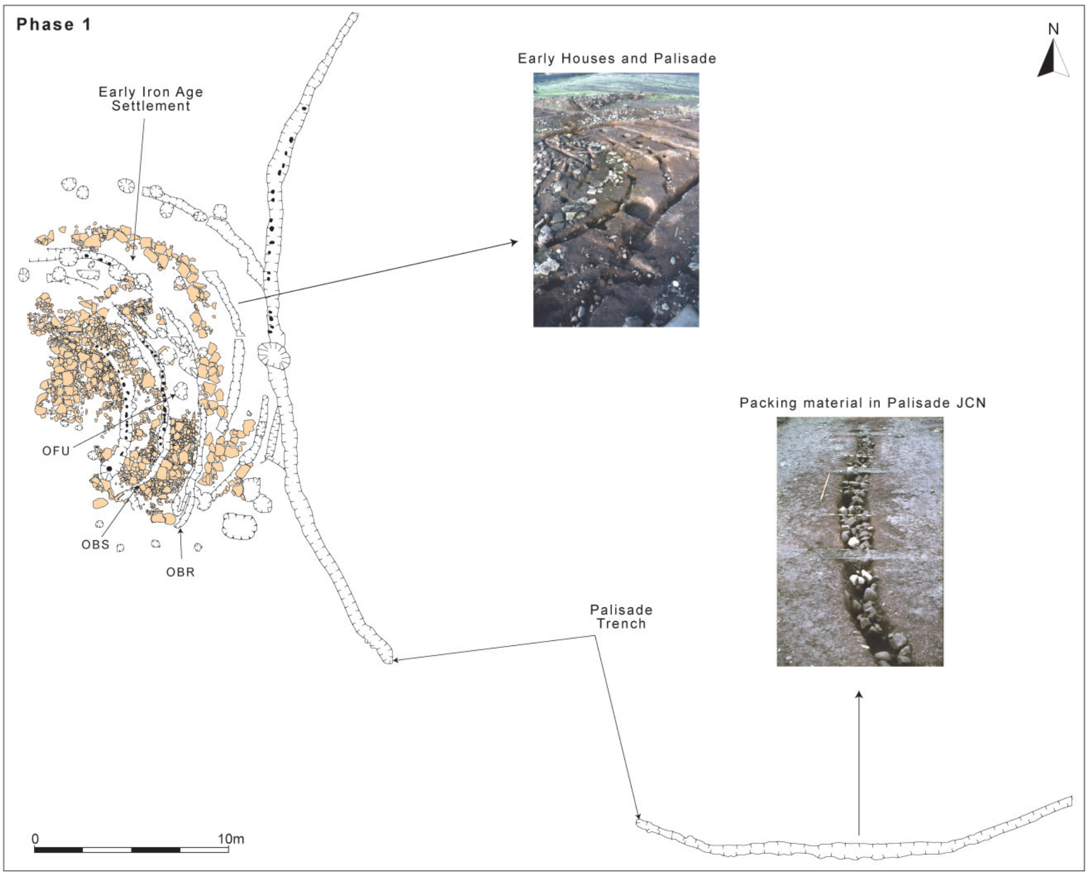



**Fig.9**: Phase 1 plan of Broxmouth. (Broxmouth Hillfort Project 2008-2012)

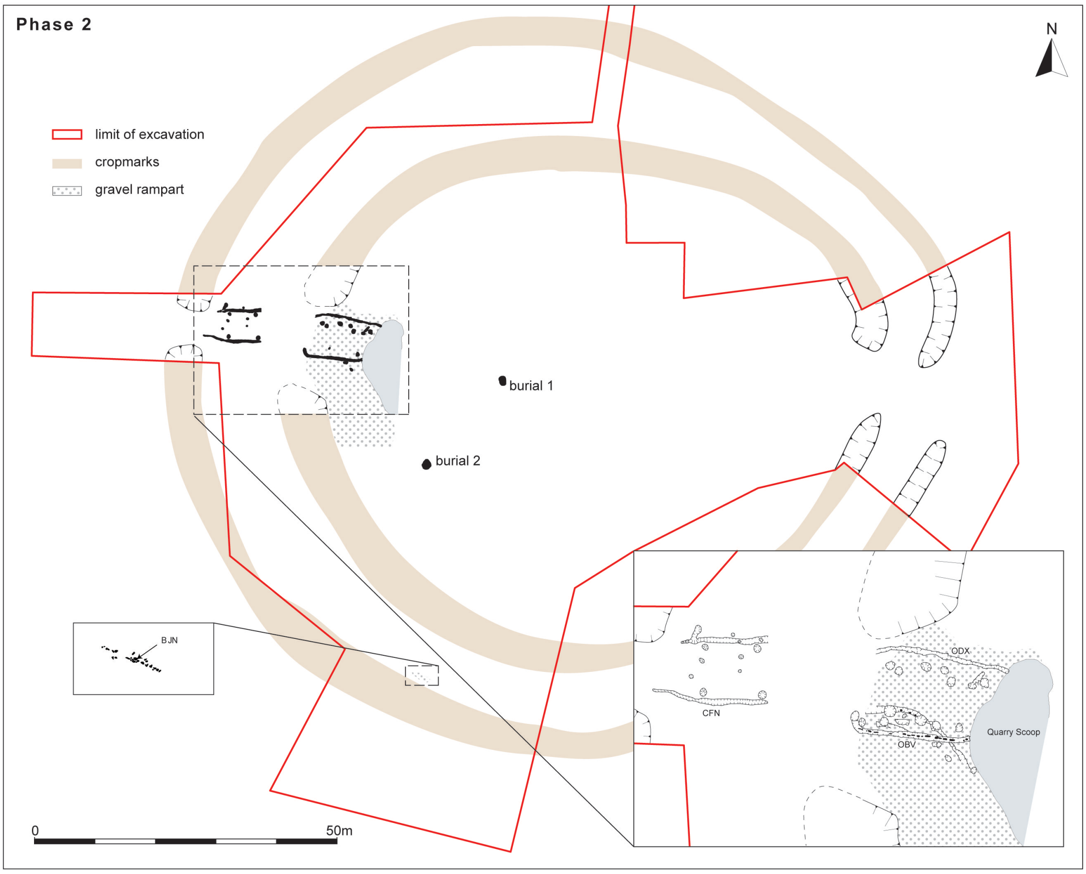



**Fig.10:** Phase 2 plan of Broxmouth, the bivallate Hillfort. (Broxmouth Hillfort Project 2008-2012)

Phase 2 Inner Ditch, and was heavily truncated by Phase 6 settlement in the Interior.

Phase 2 (515 - 380 cal BC) Early Hillfort:

The Phase 1 settlement was cut into by the Inner Ditch and Middle Ditch which were first cut around the 5th century BC, at the same time as the East and West Entrances were constructed. The ditches were allowed to silt naturally, and there was no recorded midden dumping in the ditches, explaining the few finds found in this phase.

Phase 3 (400 - 225 cal BC) Later Hillfort:

During Phase 3 the Inner and Middle Ditches were re-cut, the latter several times, and an Outer Ditch constructed. Also in this phase the West Entrance was infilled and the entrance moved to the South West, while the East Entrance remained open. As was the case in Phase 2, no internal settlement evidence survives from this phase. At the end of this phase the ditches were all infilled very quickly at the same time as the burning of posthole structures in the entrance gateway (all within the period 490 - 200 cal BC, SUERC 36093 and SUERC 36097 to 36102). Included in the various infill deposits were large amounts of faunal bone and refitting groups of late prehistoric pottery. A sheep and a lamb were buried separately into the top of the Inner Ditch eastern terminal at the end of this infilling episode, both were directly dated to 400 - 200 cal BC (SUERC 36089 and SUERC 36090). This may be the remains of feasting events.

Phase 4 (320 - 240 cal BC) Post-Hillfort Occupation:

In this phase structures were built over the infilled Inner Ditch and into the Interior at the West of the Hillfort, probably the remains of a much more extensive settlement. This

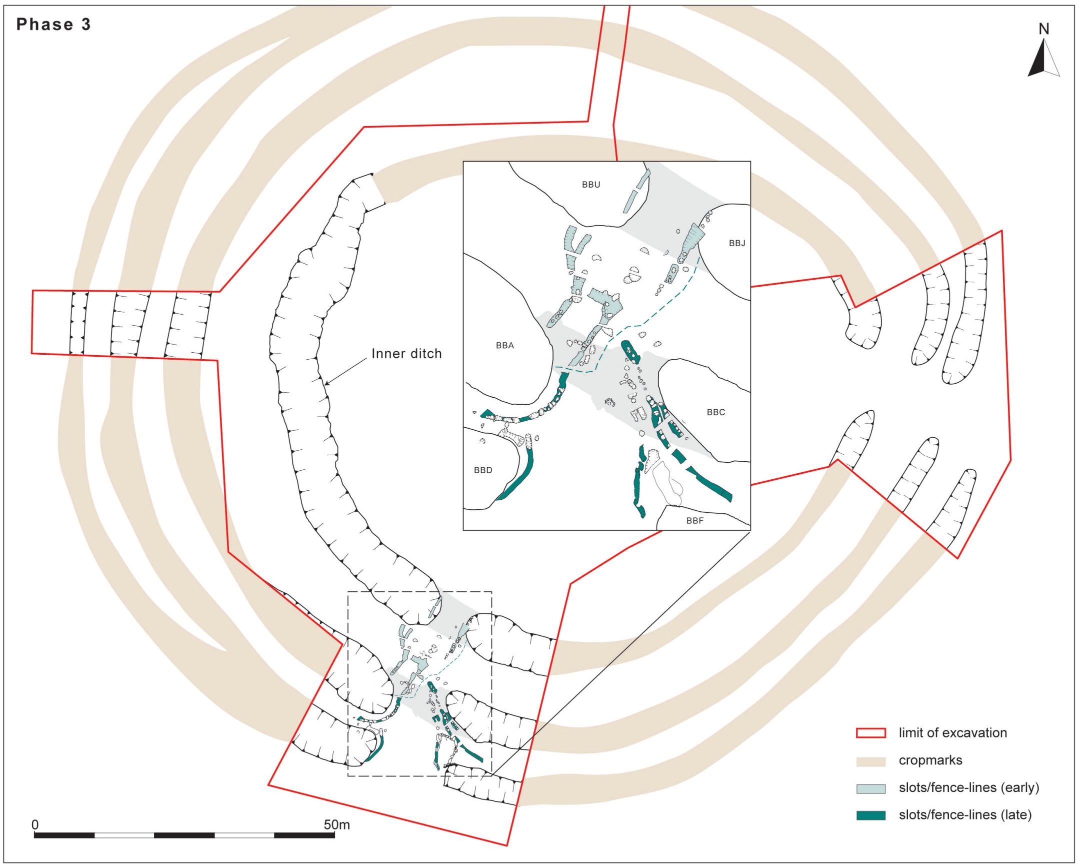



**Fig.11**: Phase 3 plan of Broxmouth, the multivallate hillfort. (Broxmouth Hillfort Project 2008-2012)

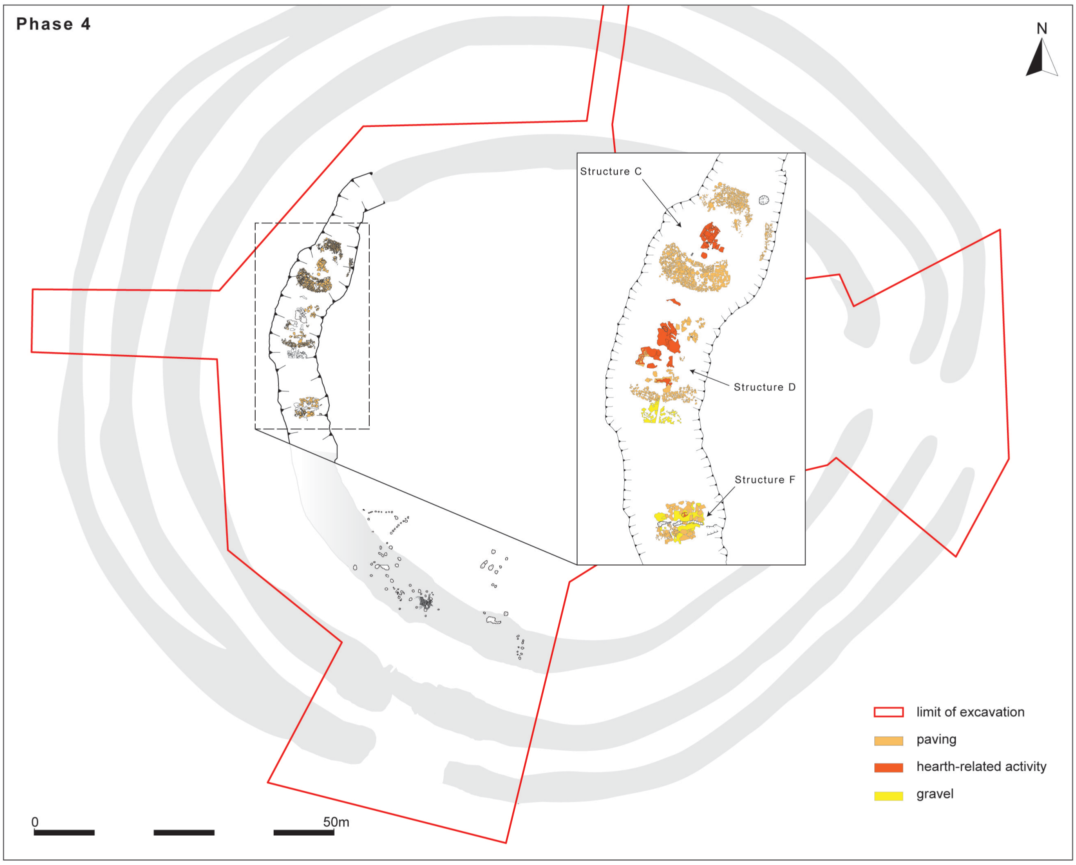



**Fig.12**: Phase 4 plan of Broxmouth, showing settlement over the Inner Ditch. (Broxmouth Hillfort Project 2008-2012)

phase is aceramic (except for two sherds which bridge late Phase 3/ early Phase 4) and has relatively few artefacts, but this is likely due to the fact that structures were kept relatively clean and that no midden deposits were excavated in this phase.

Phase 5 (255 - 70 cal BC) Middens Sealing Occupation and south-west Entrance Later Use and Abandonment:

In Phase 5 middens were deposited over the abandoned slumped structures in the Inner Ditch. These middens were rich in finds including worked bone and antler, worked stone, late prehistoric pottery, a fragment of samian, copper alloy and iron objects, fragments of worked shale/cannel coal and the majority of stone balls. At the South West Entrance an adolescent female was buried (dated 370 - 110 cal BC, SUERC 24247) before the construction of the roadway on top. The roadway was subject to a series of resurfacing episodes, and then rubble middens dumped over this area. To the north of Broxmouth a cemetery was created in which 10 individuals were interred, representative of one to four generations from a small segment of society.

Phase 6 (135 cal BC - cal AD 260) Interior Occupation:

During Phase 6 the houses in the Interior were constructed, refurbished and then abandoned. The creation of house stances truncated the earlier phases at Broxmouth. More midden built up over the Inner Ditch during this period of occupation, but radiocarbon dates indicate that this was old midden from Phase 2/3 showing that truncation of earlier deposits was taking place. These middens were similar in character to those from Phase 5. In the interior in Phase 6 finds are found in midden infill deposits in houses, in pits and postholes associated with houses, and in walls and paving. The hoard dug into the top layers of House 1 (which included three sherds of samian, five

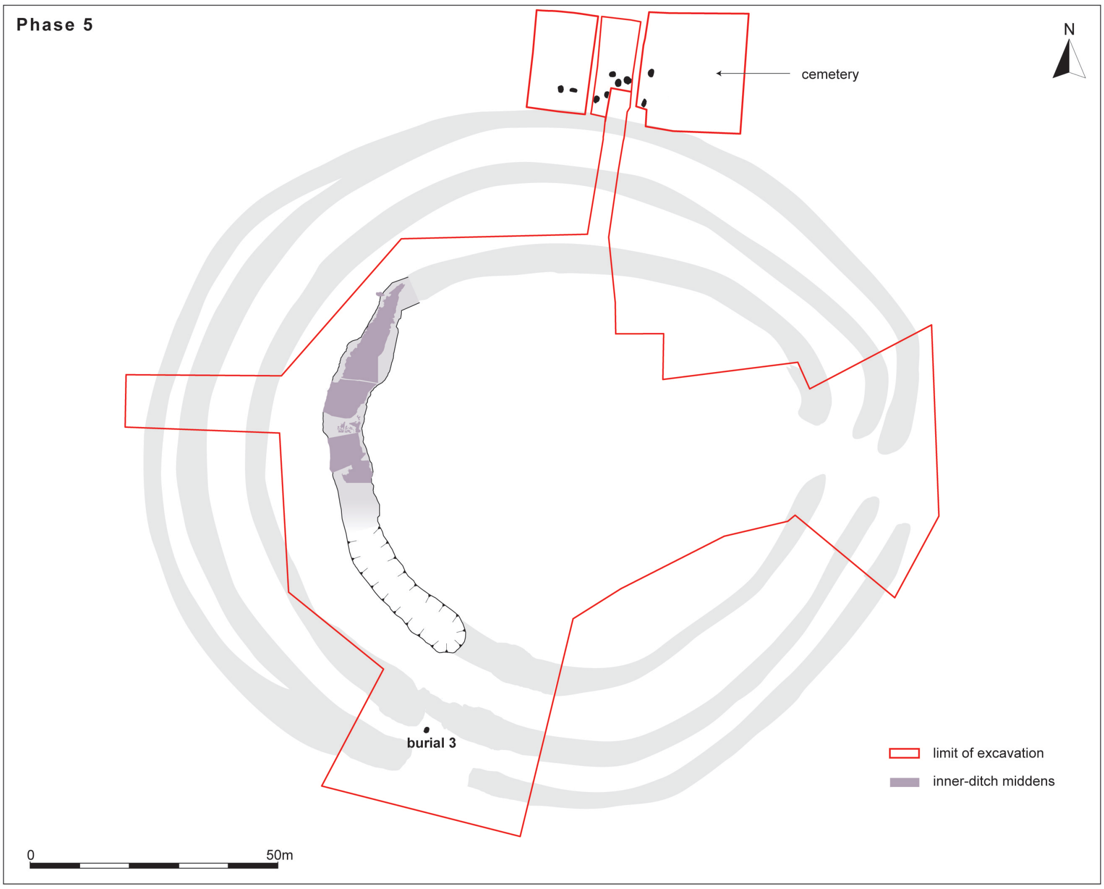



**Fig.13**: Phase 5 plan of Broxmouth, deposition of middens over the Inner Ditch settlement. (Broxmouth Hillfort Project 2008-2012)

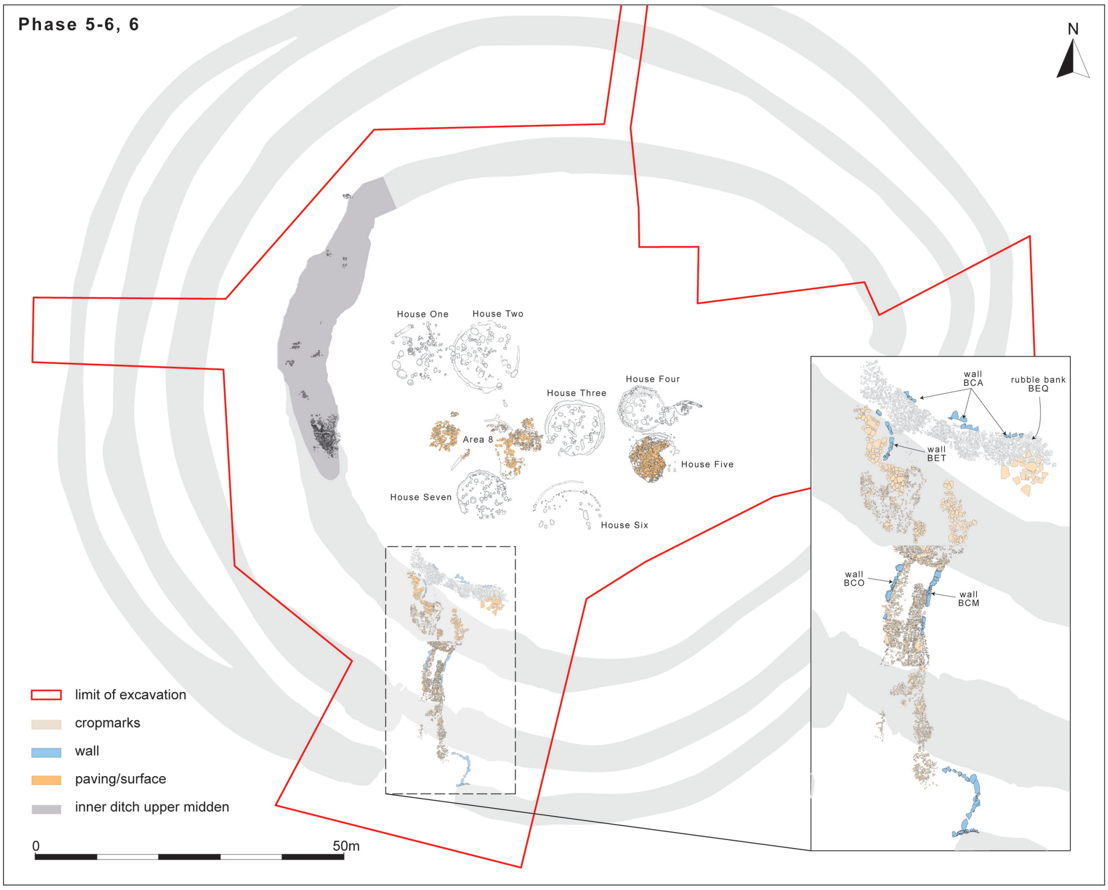



**Fig.14**: Phases 5/6 and 6 plan of Broxmouth showing occupation in the interior. (Broxmouth Hillfort Project 2008-2012)

glass Romano-British bangle fragments and a piece of Roman bottle glass, Figure 71) and the pits outside House 6 (which included worked stone, worked bone, and the majority of copper-alloy objects (including a horse harness fitting)) are perhaps representative of the latest activities on site.

Overall, notably greater quantities of finds were found in phases 3, 5 and 6. Phase 6 represents nearly 30% of the total assemblage. The lack of material culture and aceramicity in Phase 4 is interesting, but this is likely due to a lack of excavated midden deposits from this phase and is characteristic of the clean primary occupational contexts which were excavated. Additionally, the absence of pottery in Phase 2 can be explained as taphonomic, since the East and West Entrance areas excavated in this Early Hillfort phase were heavily truncated by later activity. It is, however, surprising that no pottery (except two sherds GAS and GAT, possibly intrusive) were found in Phase 1 at Broxmouth when we have evidence for iron working and structures. The quantity of pottery recovered from each phase at Broxmouth is biased to the phases in which large midden contexts were excavated. Most of the querns (29% of all saddle and 81% of all rotary querns) were found re-used in paving, walls and rubble infilling contexts in the houses in Phase 6. Therefore, the large size of this quern assemblage owes its recovery to the well-preserved areas of paving and upstanding stone built structures in Phase 6 at Broxmouth.

It is clear that any attempt to deduce developments of artefact typologies over Broxmouth's occupational history is affected by the nature of depositional activity occurring in each phase and the movement of middens around site. Additionally, materials are rarely found in primary contexts. Residuality is a major issue; between

19% and 24% of radiocarbon dates from stratified contexts in Phase 6 are residual (Armit and McKenzie in prep. 2013). This must be borne in mind when considering the chronological development of materials, and when looking at Table 1.

Nevertheless, despite residuality and truncation being major factors, some patterns can be deduced. Developments in pin types and the restricted use of pig fibulae in Phase 3, shale/ cannel coal working and the presence of stone balls limited to Phases 3 and 5, the appearance of rotary querns in Phase 5, are all potentially chronologically sensitive (Maxwell in prep. 2013). There is also a shift in dominance towards finer late prehistoric pottery in Phase 5, although the significance of this will be discussed in Chapter 5. Otherwise, there is evidence for iron working and objects of copper-alloy and iron in all phases (though predominantly Phases 5 and 6), while worked bone and antler, and worked stone artefacts other than querns are fairly evenly spread throughout all phases (ibid.).

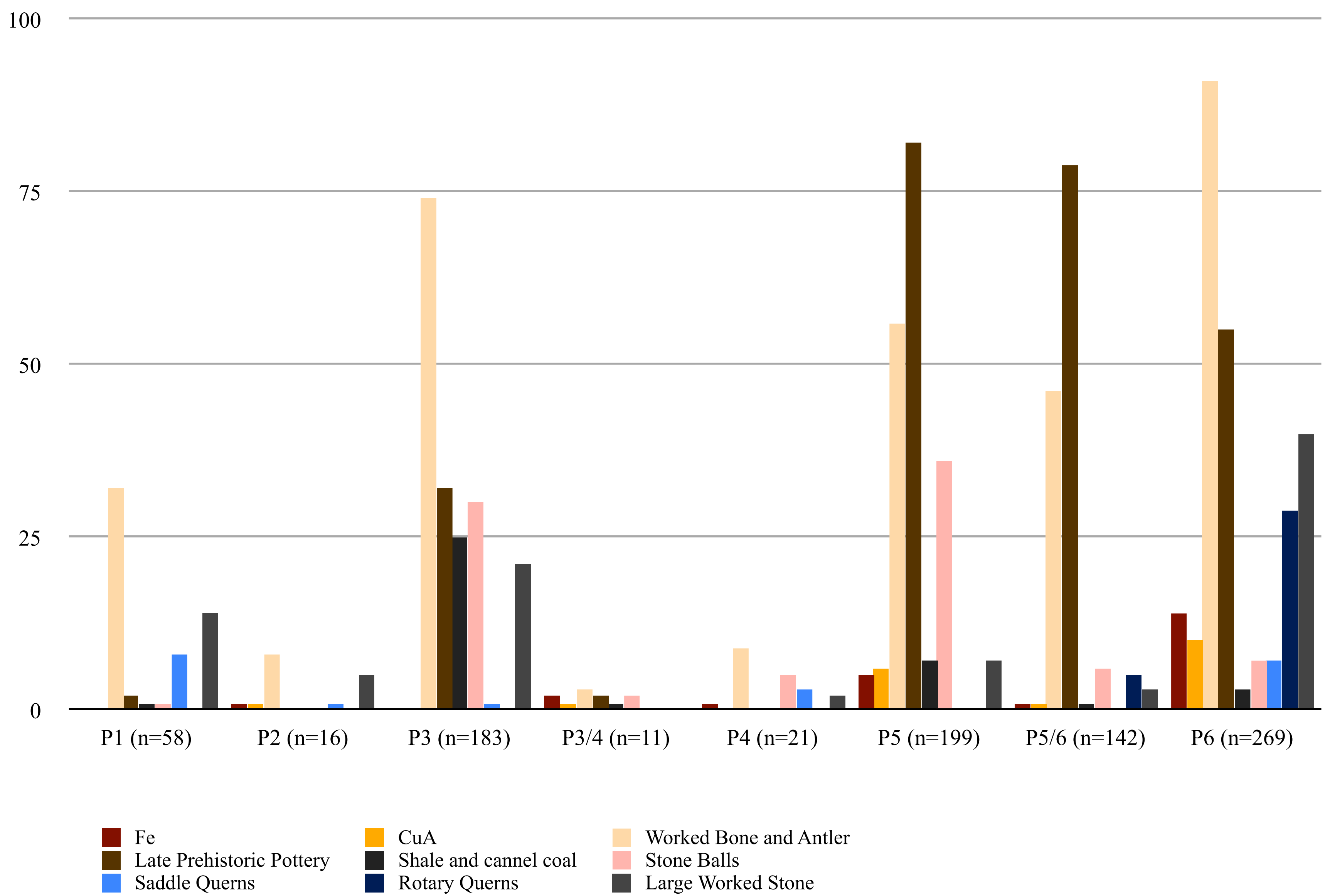



**Table 1:** The main material categories present at Broxmouth by phase. Worked bone and antler, and late prehistoric pottery dominate; this is a factor of preservation. Much of the material in phases 5, 5/6 and 6 is residual and is from earlier phases.

# Chapter 4 Worked Bone and Antler

Broxmouth is the only Iron Age site on the east coast of Britain which has produced more than 40 artefacts (Figures 15 and 16) of antler and bone and therefore is an important assemblage within a British Iron Age context. This chapter will consider the materiality of worked bone and antler from Broxmouth in its local context with comparison to sites in East Lothian. This will allow detailed contextual analysis of the materiality of bone and antler, as an alternative to the grand narrative of pins and needles (and combs). Objects made of bone and antler are actually very varied including both 'tools' and 'decorative objects' in the Broxmouth and comparative East Lothian Iron Age assemblages, suggesting that the materials of bone and antler played important pragmatic, social, political and ideological roles in their appropriation, use and deposition. Therefore a typological approach to this material is not appropriate. This chapter will totally abandon artefact categories based on type, form and assumed function which have directed previous studies, and will alternatively follow a biographical structure to analyse the relationships between materials and people during social contexts of appropriation, use and deposition.

### 4.1 Pins and needles

Bone materials are commonly used to make what are classified as 'tools', including picks, levers, hafts, points, gouges, awls, handles and combs, many of which do not change much in form throughout time and geographically (St-Pierre and Walker 2007). As a result, recognition of these objects as having social, political or ideological significance has been largely neglected (ibid.: 2) and instead researchers have focused on questions of their pragmatic function and use. This is the case for most worked bone reports of assemblages from British Iron Age sites. However, during the Iron Age bone materials were also often used to make combs, pins, beads, toggles and other diagnostic objects which can sometimes be compared to metal counterparts. It remains that work to date on Iron Age worked bone and antler objects has focused on these few objects of diagnostic form which could be related to wider Iron Age art schemes more often found in metalwork and pottery.

Decorative bone and antler jewellery or combs related to personal grooming, were usually dealt with by organising them into typologies to define different cultural groups and their movement and influence through time. Childe (1935) established typological connections between Atlantic and southern British assemblages, from which followed the work of Stevenson (1955), Hodson (1964) and MacKie (1965). More recently these cultural connections using objects of bone and antler have been revised by Harding (1982), Foster (1990) and MacKie (2010). The fact that bone and antler rarely survive and is thus a very partial record, means that work of this nature has focused on sites in Atlantic Scotland (Foster 1990, MacKie 1965:115 & 118, MacKie 2008 and 2010, Stevenson 1955) and other very few exceptionally well preserved assemblages including Danebury (Cunliffe and Poole 1991), Maiden Castle (Wheeler 1943: 298-303, 307), and the antiquarian excavated sites of All Cannings Cross (Cunnington 1923: 74) and Glastonbury Lake Village (Bulleid and Gray 1911: 266) where combs, pins and needles as typological indicators were employed to make connections across relatively vast time periods and geographical areas. This approach is not deemed appropriate by some academics working in Atlantic Scotland and a local approach is alternatively preferred because in many cases uniformity is clearly lacking from material cultures (Topping 1987:83) and from site to site there is evidence for different economic and social structures, let alone with comparison to sites in southern Britain (Gilmour and Cook 1998: 327).

An attempt has been made to move away from the pan-regional towards a fully contextualised focus, and this is epitomised in the analysis of the Iron Age assemblage from Cadbury Castle, Somerset which attempts to understand 'the objects as context dependent' (Barrett et al 2000: 179). Yet, despite not wanting to 'treat artefact categories as if they embodied some absolute value' (ibid.:179) the bone and antler objects in the Cadbury Castle report are divided into two chapters entitled 'Clothing and decorating the body' and 'The body as agent'. These chapters respectively consider bone and antler artefacts as either efficient tools 'by which the body as agent works upon the world' (Barrett et al 2000: 229, Britnell 2000: 242 and 253-256) or as decorative objects 'which adorn the body' (Barrett et al 2000: 179). Whilst the structure of this report admirably does away with typologies and hence discourages attempts to place artefacts in a culture-historical narrative, it is not successful at re-addressing the problem of assumed value but still infers a hierarchy among tools and decorative objects (Barrett et al 2000). A balanced view of agency by which objects and people influence each other is absent from their analysis.

Tuohy, on the other hand, has emphasised the social roles of decorated long-handled combs in her work, to consider the gender and social position of their makers, users and traders (Tuohy 2000: 137-152). Associating these artefacts to specific makers, users and traders is concluded to be ambiguous, but it is likely that the whole household including young adults and older individuals and males and females were involved in the various stages of making, decorating and using these combs (ibid.: 152). They were not specialist items associated to either a male or female gender (ibid.), but were involved in a complex network of social relationships.

### 4.2 The East Lothian worked bone and antler assemblages

The Broxmouth worked bone and antler assemblage is very well preserved for south-east Scotland numbering 374 artefacts including unmodified, incomplete roughouts, manufacture debris, worked, broken and re-worked objects, some of which were bone and antler parts of composite objects. The good preservation is probably due to Broxmouth's siting on a limestone outcrop, and comparison to other East Lothian Iron Age worked bone and antler assemblages (Figure 15) suggest that Broxmouth is representative of what could be absent locally due to acidic soils (Lowther 2000: 143).

Worked antler and bone was a common material at Broxmouth representing approximately one third of the total artefactual assemblage (374 bone and antler artefacts). Disarticulated human bone fragments were also found in the interior at Broxmouth. No use-wear is found on these fragments and so they are not included in Section 4.5 which examines actual exploited affordances, but they should be considered as artefacts. Antler dominates the total assemblage found at Broxmouth representing approximately 31% (not all objects could be attributed to species), the majority of which were utilised antler beams and tines. The Broxmouth evidence suggests that antler for working was cast naturally and was not from hunted deer.

The worked bone from other East Lothian sites hint at similar practices, though the evidence is severely lacking (there are only 64 worked bone objects in total, Figure 15 and Appendices 1 and 2). Sites with worked bone include Archerfield (n=19), Craig's

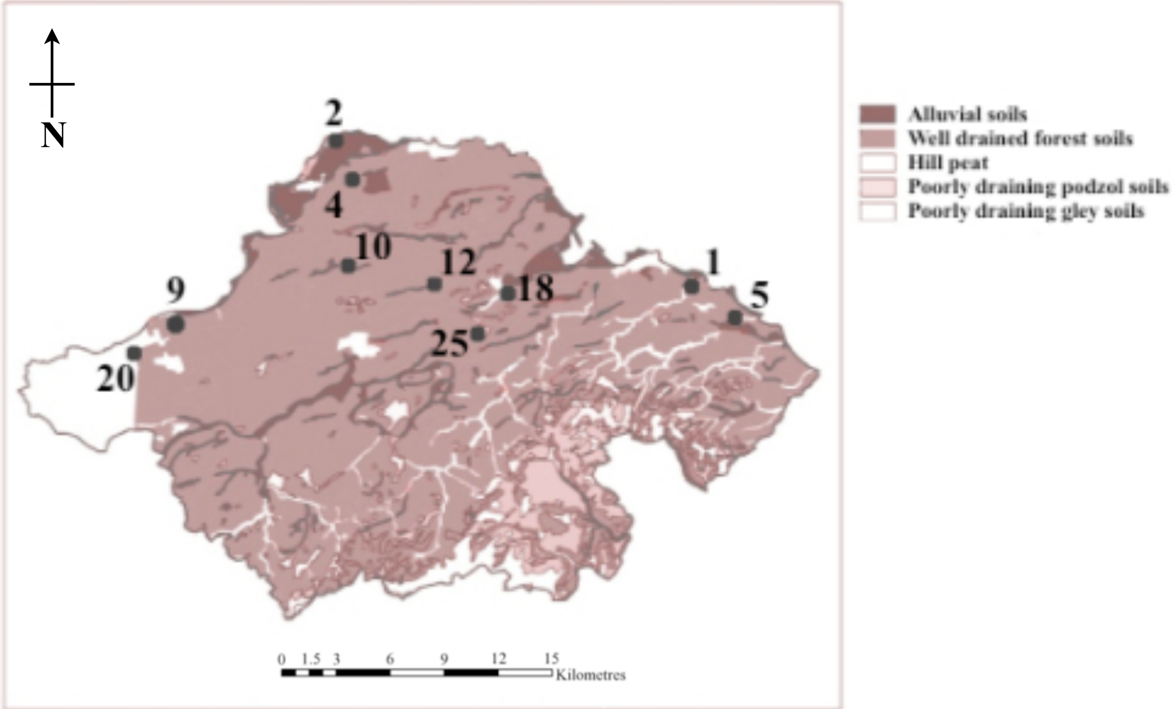



**Fig.15:** The excavated sites in East Lothian (see Figure 1) with worked bone and antler in their assemblages. (Map: R Reader and M Maxwell)

Quarry (n=2), Dryburn Bridge (n=2), Ghegan Rock (n=21), North Berwick Law (n=8) and Traprain Law (n=11). Sites with evidence for working bone on-site are: Archerfield, Dryburn Bridge, Ghegan Rock (including a bone roughout for a possible spoon (HD 98)), and North Berwick Law (the presence of an unfinished antler tine object (HR 740)). Worked bone from East Lothian could not be attributed to species except for two utilised cattle long bones from Fisher's Road East (Lowther 2000: 145) and two objects made of whale bone; a fragment from North Berwick Law (HD 1855) and a worked vertebrae from Fisher's Road East (Lowther 2000:145). Re-working and recycling of worked bone objects in order to extend their biographies is detected on three examples from East Lothian at Ghegan Rock (HD 78 and HD 79) and Traprain Law (GV 1003).

There are problems in the recovery and preservation of faunal bone assemblages from East Lothian. The faunal bone recovered from Edinshall is now lost (Dunwell 1999: 341) and most antiquarian reports only list that animal bones were present, and only with occasional reference to bone element and/or species. Acidic soils are again a problem, as noted at the sites of Traprain Law (Ritchie 1916: 142) and the Traprain Law Environs Project where only the teeth remained in any quantity (Whittinghame, Knowes, Standingstone, Foster Law) (Gidney et al 2009: 181). At St Germains very few contexts contained identifiable bone, and none could be positively identified to species (Thoms 1998: 242). On Ghegan rock, the Iron Age deposits included cattle, sheep/goat, horses and pig, alongside several dogs (Laidlay 1868-70). It was noted that nearly all the bones were broken for marrow extraction and that a few showed signs of burning (ibid.: 375). Unfortunately, small bones were dismissed as of no value and were not kept after excavation (ibid.: 375). Newmains is an exception and has a large faunal assemblage for the region but it remains unpublished. This means that comparable data is only available from a small number of sites.

Antler accounts for approximately half of the total of all worked bone and antler assemblages put together. All six of the worked antler beams or objects with surviving burrs from East Lothian show that they were cast and not from hunted male deer (three fragments of worked antler from Archerfield (HM 19), Dryburn Bridge (DB 79) and North Berwick Law (FB. YT. 532) and a spindle whorl made from a cast pedicle at Craig's Quarry (X-HH-633)). There is only one cast roe-deer antler fragment, from North Berwick Law (FB-YT-532). Antler appropriated for working in East Lothian was harvested, as discussed below, and then perhaps circulated as raw materials in wider networks. Sites with evidence for antler working are Archerfield, Dryburn Bridge and North Berwick Law.

*The assemblages in a national context*

In a national context the size of the assemblage at Broxmouth is similar to frequently referred to published Iron Age sites from Southern Britain, given in Figure 16. Notably there is no evidence of antler working debris at Maiden Castle, Dorset (Wheeler 1943: 297-311). The preservation at Glastonbury Lake Village, Somerset, due to its waterlogged deposits surpasses all with an assemblage numbering 861 objects of bone and antler (Bulleid and Gray 1911: 434-479). All of the Scottish sites, excepting Clickhimin (Hamilton 1968), include evidence of antler manufacturing debris within their assemblages. Evidence of animal bone manufacture debris, however, is less well recorded except in the case at Cnip, Lewis, where three fragments of animal bone-working debris were found (Armit 2006).

These worked animal bone fragments found at Cnip were all from Phase 2 of the site, two of which were found re-deposited in a pit-like structure and one in an occupation deposit in a wheelhouse (Armit 2006: 29, 68, Hunter 2006a: 140). However, these three fragments could equally be evidence of re-working for another use, for example the long bone shaft found in Wheelhouse 2 has been detached by cutting (finds code SF 293) and subsequently re-used as a working surface as indicated by punch-marks (Hunter 2006a: 140). At Croft Ambrey (Stanley 1974), a worked bone cylinder is referred to as evidence of animal bone working on site, but again it is an offcut from a probable handle (ibid.:176) and is therefore evidence of secondary working. Similar types of re-use are common at Broxmouth. Whilst the absence of manufacture debris may suggest that animal bone was not primarily worked on sites, the lack of evidence may alternatively be explained by differential preservation to antler and/or the nature of

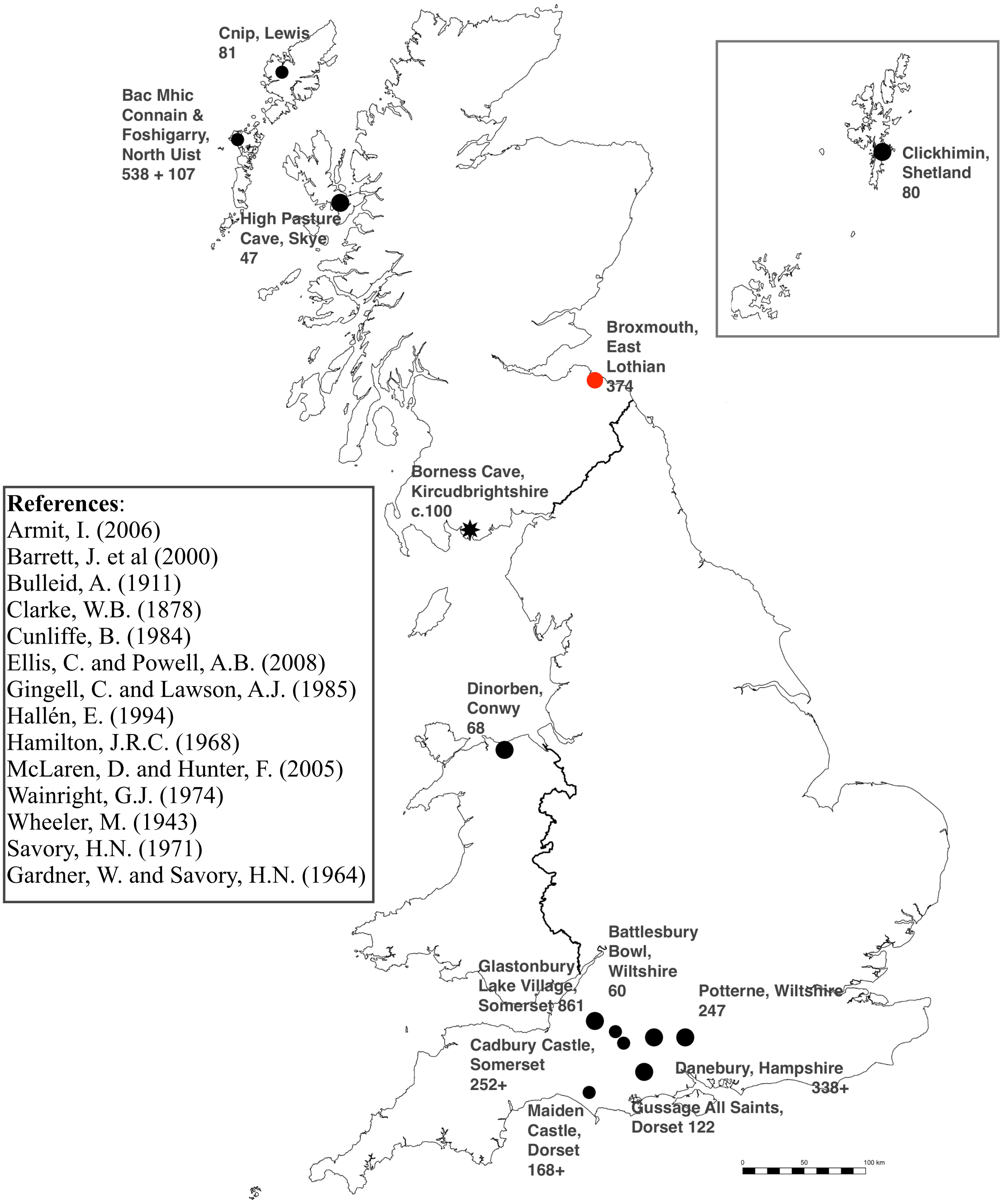



**Fig.16:** The best preserved worked bone and antler assemblages from Iron Age Britain (assemblages with more than 40 objects present). Preservation is best in Atlantic Scotland and south-eastern Britain. There are obvious gaps in the data from the rest of England, Wales and Southern Scotland, in part due to bias in excavation and publication. The way assemblages are typologised varies from site to site and not all include manufacture debris in their catalogues; the number of bone and antler artefacts at Danebury, Hampshire and Maiden Castle, Dorset would drastically increase if manufacture debris were included in their published catalogues.

Scale of excavation: ● moderate ● large-scale ✸ antiquarian its working. Manufacture for the majority of animal bone objects involved whittling and carving resulting in non-diagnostic shavings or small fragments. If these small fragments are detected on-site, they are more likely to be catalogued as part of faunal assemblages. In contrast to the lack of evidence for working animal bone at other sites in Iron Age Britain (Figure 16), this is not the case at Broxmouth since 9% of the worked bone and antler assemblage are definite unfinished artefacts or roughouts suggesting working on-site. Nevertheless, the presence of antler manufacture debris on nearly all of these excavated British Iron Age sites in the above map is potentially significant; for example at Dinorben, the excavators (Gardner and Savory 1964: 167) contrasts the lack of animal bone objects with the abundance of worked antler, and this imbalance is noted as a wider characteristic of the Welsh Marshes (Stanley 1974: 176-178). It is interesting to note that the same imbalance between the predominance of antler in comparison to animal bone artefacts is true in Iron Age East Lothian including Broxmouth.

Iron Age people’s engagements with worked bone and antler will be further explored in the next four sections of this chapter which examines the surviving Iron Age assemblages from East Lothian. The evidence, in comparison with the detailed study of Broxmouth, shows that similar activities with worked bone objects occurred irrespective of site type in this area. Throughout the Iron Age in East Lothian human and material relationships were continually being reworked (carved, whittled and polished).

### 4.3 Appropriation

*Antler*

The only deer skeletal materials definitely appropriated for working by people throughout the Iron Age in East Lothian were antlers. The appropriation of antlers was determined by the passing of seasons which was in turn linked to the sexual cycle of stags.

Comparing the faunal bone to the worked bone and antler assemblage at Broxmouth show different trajectories of appropriation. There is evidence for deer butchery at Broxmouth because both red and roe deer species are present in the faunal assemblage, though red deer are twice as common (Cussans in prep. 2013). Only mature deer were targeted for hunting, suggesting the maintenance of this wild resource (ibid.). The faunal deer skeletal elements represented are dominated by bones of the forelimb with few skull and hind limbs present, showing that elements were selected to be taken back to site (ibid.). The overwhelming majority of the worked antler is red deer, only nine out of the 156 antler beams and tines are from roe deer. Conversely the antler which was utilised or worked were naturally cast from red deer and were not cut or sawn off from hunted deer. Only five of the worked antlers were cut from the skull indicating butchery, as opposed to 28 which are cast antlers and were therefore collected from the ground.

Deer only cast their antlers once a year and so collecting cast antler was a seasonal activity. Red deer cast their antlers in late winter or spring, when testosterone levels in deer fall (Price and Allen 2004: 810) and grow a new set over the summer in time for the autumn rut, though this may vary slightly depending on specific ecologies

(MacGregor 1985: 35). This period of re-growth has been proven to be linked to increasing testosterone levels in red-deer (Bartos et al. 2000, Bubenik et al. 2005: 186, Darling 2008: 160-161). Antler velvet (the soft covering providing vitamins and blood to aid re-growth) is then cast in late summer/ autumn to reveal fully formed hard antlers. Immediately after this there is noted stimulation of growth in the gonads of red deer. The shedding of velvet marks the sexual maturity of red-deer stags. The rut occurs in late autumn and into winter. The cycle then begins all over again in spring. Deer return to the same spot annually to cast their antlers and will eat them shortly after shedding when nutrients are in short supply (Andy Summers, the Assynt Foundation *pers comm*. Darling 2008: 155). Acute know-how relating to exactly where and when to harvest antler was required, and may have involved expeditions over long distances. This

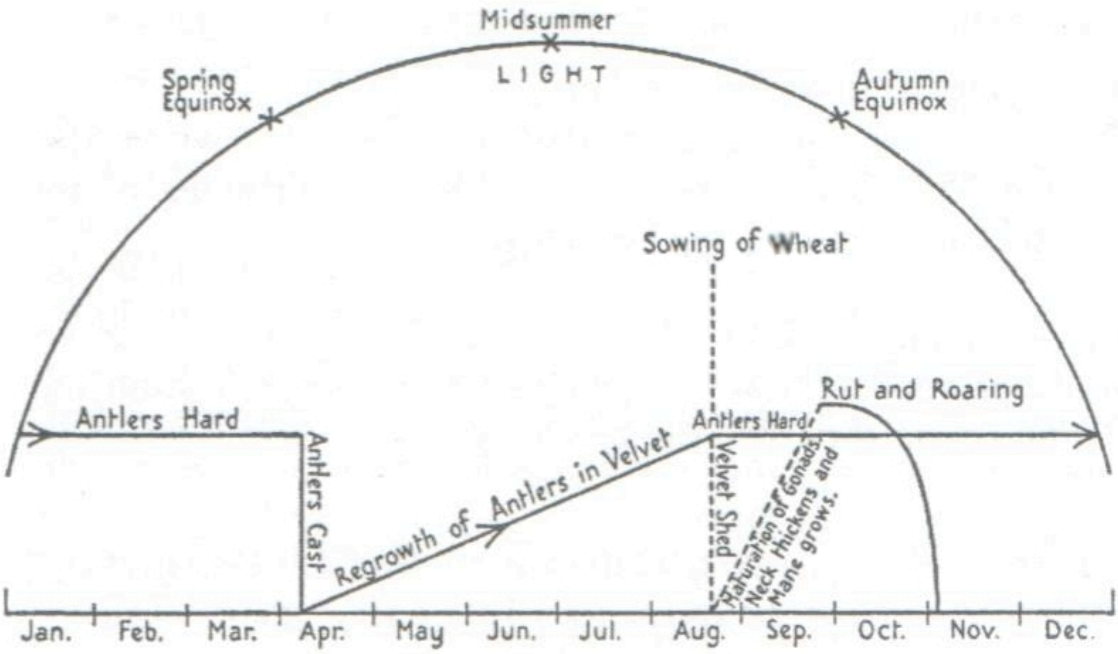



**Fig.17:** A seasonal diagram showing the repeated cycle of red-deer antler growth and shedding, and the sowing of wheat (Van der Ween and Jones 2006). Iron Age people will have known this cycle and it will have cosmological importance linked to ideas of fertility, sexuality, renewal and time. (updated from Darling 2008: 161 fig.12)

required an intimate knowledge of the life cycle of deer, and is testament to their semi-managed wild status in the Iron Age.

Male deer become sexually mature only once they shed their velvet (a soft covering which provides antlers with blood circulation and nutrients during growth) and this takes place in late summer or autumn (Figure 17). Shedding of the velvet has been observed to be directly linked to testosterone levels and stimulation of growth of the gonads of deer (Bartos et al. 2000, Bubenik et al 2005: 186, Darling 2008:160-161 and Price and Allen 2004). Today, the velvet from antlers are collected before becoming fully calcinised and used in alternative medicines as a health supplement to aid blood circulation, reduce joint pain and to improve stamina; whilst beneficiary side effects include increase in the male libido (Figure 18). It is also possible that Iron Age people believed in similar benefits of velvet and exploited it. Soon after the shedding of velvet, from late summer to early winter, mature stags take part in the rut, a noisy mating ritual where the most dominant win a hind (Figure 17). The dominance of the stag and the rut is of powerful significance in modern human cultures, for example the deer dances performed by the Yaqui North American first peoples (Schechner 1985: 5-7). The spiritual power of the stag, to bring renewal or to empower individuals, is expressed in the artist Marcus Coates' attempt to become deer in his performance work 'Journey to the Lower World' (2004). In this humerous and unsettling piece he performs a mock


**Fig.18:** Deer antler velvet is today ground down and provided as alternative health supplements and remedies. Side affects apparently include increase in the male libido, reducing joint pain and general feelings of wellbeing. (e.g. http://www.supervelvet.com/, http://www.velvetenergy.com/) (image http://www.deerantlerplus.net/)

shamanistic ritual clothed in a deer hide complete with head and antlers, to a community group of tower block residents who were about to be reluctantly expelled from their homes.

Seasonal harvesting of antler, and possibly velvet, was integrated into the cosmology of Iron Age peoples' lives, related to ideas of sexuality, empowerment and indexical to the agricultural cycle of harvesting crops in autumn and spring (Figure 17). The seasonal harvesting of velvet and antler will have taken place in autumn and spring respectively, times in the year when cereal crops were both sown and harvested (Darling 2008, Van der Veen and Jones 2006). Hingley (1997: 9-10) has noted that fertility and re-growth were powerful metaphors in the Iron Age and that iron ore could have been similarly harvested from the fields after tilling (ibid.). The antler cycle too, in addition to the agricultural cycle, will have been a powerful measure of time, growth and re-growth in the Iron Age. Due to these limitations of resourcing, it is probable that antler will have been a valued material exchanged between sites in East Lothian.

*Animal bone*

Across East Lothian cattle and sheep were the most commonly used for making objects, and pig and horse rarely used. This pattern of appropriation compliments the faunal assemblage from Broxmouth which is dominated fairly constantly through the phases by the domesticates: cattle (23% of the total faunal assemblage) and sheep/goat (11% of the total faunal assemblage) (Cussans in prep. 2013). Pig was also present, particularly in phases 3, 5 and 6. Objects made out of pig bone include fibula points (DAE, DCC, EAC and FHH) and a pendant made from an incisor (EAW), all restricted to Phases 3 and 5/6. Wild species were present in the faunal assemblage in very small numbers, and of these red deer were the most abundant. There is only one artefact possibly made of skeletal deer bone (not antler) at Broxmouth which is a robust bone point (FXR) (it could equally be made from a horse or another large mammal long bone). Horse bones represent only 3% of the total faunal assemblage (ibid.), compared to 7% of the worked bones. Horse was used to make one (DQG, phase 5), perhaps two points (CBC, Phase 6 - may be either horse or deer bone) and one handle (DVX, phase 5/6). There is only one object made from whale bone (no code) from Phase 1, probably opportunistic use of a beached whale or bone washed up on the nearby coast, though it is not water-worn suggesting the former.

The finding of objects made from pig bone in Phases 3 and 5/6 tallies with the importing of pig for butchery in these phases (Cussans in prep. 2013). Pigs were not reared on site but were imported because there is a total absence of adult pigs in the faunal assemblage, which would have been used for breeding, and also very low numbers of piglets in the Broxmouth assemblage. The only pig bones at Broxmouth are therefore representative of adolescent pigs which provided the best meat (ibid.).

The communities at Broxmouth practiced mixed farming economies. Between 20% and 40% of cattle were killed at a young age, suggesting that cattle were part of a dairying economy (Cussans in prep. 2013). Some cattle were kept for meat, breeding and traction (ibid.). The sheep/goat all survived beyond two months old, but a high proportion were slaughtered before 6 months old which may suggest that they were also reared for dairy products in addition to being valued for meat and wool. This was the case throughout Broxmouth's occupation, except in Phases 4 and 6 when cattle survived for longer suggesting a change in economy, perhaps an bias towards keeping cattle for meat or as a symbol of wealth, rather than for dairying. Similarly sheep/goat in Phase 4 were not used for dairying (ibid.).

Gnawing is commonly found on bones in the faunal assemblage from Broxmouth (Cussans in prep. 2013), indicative that carcasses were left exposed for a period of time before formal deposition. It is probable that the worked animal bone were sourced from these locally reared domesticates, and indeed one object in the artefactual catalogue, a distal end of cattle tibia with longitudinal perforation (FZN), has evidence of butchery at its epiphiseal end (Hunter and Gerken in prep. 2013). Furthermore, it is noted in the Broxmouth faunal report that smaller bones, such as the phalanges, were noticeably under-represented and the reason given for this is a lack of systematic sieving during excavation (Cussans in prep. 2013). However, it is interesting to observe that a significant proportion of the bone used for working were those from extremities. Suspiciously, a sheep burial known as the 'venerable ewe', under paving at the Phase 3/4 south-west Entrance, is missing its phalanges again noted in the faunal report as the fault of the excavator (ibid.).

The faunal assemblages from other Iron Age sites in East Lothian are poorly understood. A similar range in domesticates were found at the A1 sites (Eweford cottages, Phantassie, South Belton and Biel Water), the cattle bones from Phantassie show that they were slaughtered at a young age and therefore possibly used for dairying (Smith 2008: 127) as at Broxmouth.

Cattle and sheep/goat were present at Kaimes Hill (Childe 1941: 54). These domesticates with the addition of pig are also present at Fishers Road East and West, the majority of bones were from cattle (O'Sullivan 2000: 55, Hambleton and Stallibrass 2000: 143- 156). Cattle, sheep/goat, pig and horse bones were all present at Dryburn Bridge (Thoms 1998: 86-91) and Traprain Law (Ritchie 1915:142-143, Cruden 1939: 59). Similar patterns of body part representation, ageing and pre-depositional treatment (burning, gnawing and butchery) were noted of the bones from Fishers Road East and West as part of a meat economy (O'Sullivan 2000: 53).

The taphonomic and contextual evidence suggest that different practices were ongoing at Dryburn Bridge. Surviving faunal bones from Dryburn were highly fragmented, but it is thought that this is an issue of preservation rather than of past cultural treatment (Thoms 1998: 91). The fact that their surfaces were otherwise in reasonable condition and that few gnaw marks were found on bones, means that a limited period of exposure was likely before the majority of bones were then incorporated into pit or post-hole deposits, possibly for storage, at Dryburn (ibid.: 89). No butchery evidence was noted on the bones. Additionally, no artefacts made of animal bone were found here, and only one worked antler was found in a pit directly dated to the later Iron Age 400-200 BC (Hunter 1998: 82, Dunwell 2007: 96, SUERC-4938) (ibid.).

Bone from domesticates were therefore widely available during the Iron Age in East Lothian in accumulating exposed deposits, except at Dryburn where animal bone perhaps took on a different role and were removed from everyday use. Across all East Lothian Iron Age sites pig bones are uncommon and there is a notable absence of horse and red deer bone (not including antler), indicative of their different role in society.

There are only three examples of markedly discoloured and leached old animal bone which were worked at Broxmouth (BZL, EYZ, EVV) (Hunter and Gerken in prep. 2013). Nevertheless, these few examples illustrate that it is possible that bones for working were retrieved from exposed contexts, potentially midden deposits in ditches, surface spreads and pits on site where most of the faunal and butchered bone subsequently ended up (discussed below). The movement of midden deposits around Broxmouth, particularly in Phase 5, is attested by some of the radiocarbon dates retrieved (Appendix 4). Where possible most contexts were double dated, and residuality is clear from one of the dated faunal bone samples from pit JIS in House 4 (GU-23352) which is c.200-300 years older than the other dated sample (GU-23351) from this same context. The dates also show that c.200 year old midden was used to infill House 2 at Broxmouth (Section 4.6). Approximately 20% of dates from Phase 6 are known to be residual (Armit and MacKenzie in prep. 2013). Midden contexts were curated and moved around site, perhaps valued as fertiliser for the fields and a resource of materials from which artefacts could be made.

At the Iron Age enclosed settlement of Eweford cottages, re-use of stored midden to fill the ditches in the later phase of activity at this site is documented. The midden deposits were all dark brown in colour and had bone, cereal, pottery and charcoal inclusions with little intrusion of occupation debris, indicating storage away from the settlement (Innes 2008: 134). Re-use of curated midden deposits as ditch infills is also seen at St Germains (Alexander and Watkins 2008: 216), Fishers Road East and West (Haselgrove and McCullagh 2000: 78-9, 173) and Phantassie where it was also used as house construction wall packing (Lelong 2008: 151, 157, 159, 177 and 175). At Phantassie a constructed stone lined hollow with steps descending into it, is even interpreted as a “midden store” (Lelong 2008: 167 and 187) and an old house stance was probably used as a temporary midden resource (Lelong 2008: 253). At Phantassie during the first century BC to early first century AD, midden was allowed to compost; a process transforming debris and exhausted material, including broken pottery, charred cereals, faunal and worked bone into a material that would enhance crop yields and fertility (Lelong 2008: 264). Indeed the use of middens to infill ditches marking a change from enclosed to unenclosed or to infill abandoned structures marking the passing of a household lineage, or even an individuals death, is discussed as a boundary act linked to ideas of regeneration and fertility (Lelong 2008: 265). Midden and compost has a potent smell, and at Eweford, Phantassie, Fishers Road East and West, St Germains and in Phase 6 at Broxmouth people lived within a close proximity to the stench. The use of an old discoloured rib bone (HD 1671) is also seen at Hownam Rings (examined first hand in the museum, Piggott 1947: 212-215), further indicating that retrieval from exposed contexts was a wide practice. Even further afield the occasional infilling of pits with curated or selected midden material is seen at Winnall Down, Hampshire, where there are only 11 fragments of animal bone and 0.6-1.3 rim sherds for each year of occupation, collectively found in pits (Fitzpatrick 1997: 79). At Danebury, Hampshire, the settlement ground surfaces were clean and the sherds included in pits non-abraded, suggesting the careful storage of midden (ibid.). Similarly at Broxmouth in Phase 6, the floor surfaces of structures were clean and most objects recovered from midden or pit contexts. Parker-Pearson et al (2004) have emphasised the significance of the movement of soil and its aesthetic qualities. At the broch of Dun Vulan, South Uist, the gallery had been packed with soil from a strip of land on the coast 2 km away, proven by its unique acidic signature (ibid.:72). This soil had been mixed with ash and pottery sherds and was of no better weatherproofing quality than other soils available right next to the site, and so must have therefore been used for specific signative reasons (ibid.). The use of curated midden as appropriate foundation deposits for structures is also documented at Cladh Hallan (ibid.).

Despite the abundant availability of animal bone on most Iron Age sites in East Lothian, use-lives of worked bone and antler objects were sustained until exhaustion when they were usually deposited in middens which were valued as a resource. Many objects in the Broxmouth assemblage show multiple episodes of use-wear, indicative of lengthy biographies. Actual re-working and repairing is seen on 4% of the artefactual bone assemblage, for example a comb (DCB) had its handle repaired and shows evidence for subsequent use as a 'heddle', or even as a resource for bead manufacture (Figure 25). The other examples include a utilised animal bone which was then recycled into a yoke-shafted point (ENO) and a handle which was then recycled into a bevelled tool (DIW). The evidence suggests that animal bone was not treated wastefully, but maintained, prolonged or re-introduced into networks of circulation and use. Deposition- taking an artefact out of circulation- was a significant act (Section 4.6). Therefore, even though animal bone from domesticates were widely available in East Lothian, their use for artefact manufacture may not have been frequent. Dryburn hints at a relatively quick deposition of this raw material in single phase pits, making this material unavailable for artefact manufacture (Thoms 1998: 91).

Thus we cannot discount the possibility that animal bone in worked and used states may have been exchanged between sites. Additionally, most of the total Broxmouth assemblage were originally part of composite objects indicated by sockets, probable handles and worn perforations. Although taphonomy cannot be discounted as a main factor affecting preservation, antler and bone maybe came to Broxmouth in these partially worked, disarticulated or broken states as raw material to be re-worked or re-utilised.

As will become clear in the remainder of this chapter, the deliberate curation of artefacts made of animal bone could be seen to contrast the abundant availability throughout all periods at Broxmouth of butchered cattle and sheep/goat and pig bone (in Phases 3,5 and 6) and the accessible resource of midden deposits across the East Lothian Iron Age. Animal bone artefacts were valued despite the availability of domesticated animal bone and this is probably due to recognised importance of their accrued biographies. Animal bone was not necessarily appropriated seasonally, unlike the harvesting of antler which was seasonal. This perhaps was a reason for why deer bone (not antler) is not represented in the worked bone assemblages except for one possible example from Broxmouth (Table 2), since deer were attached to the seasonal cycle while the availability of butchered domesticate animal bone was not. It is therefore interesting to note that the only artefact made of bone or antler at Dryburn Bridge was a worked cast antler (Hunter 1998: 82, Dunwell 2007: 96). The appropriation of antler from deer was involved in a different belief system linked to seasonal time (as discussed above).

*Disarticulated human remains*

The disarticulated human bone fragments were found in a variety of midden, occupation and ditch entrance terminal deposits. Of the 22 disarticulated human remains found at Broxmouth 13 were head skeletal fragments (Armit et al in prep. 2013). The iconography of the head re-occurs in the European Iron Age and there are numerous circumstances of human skull fragments turning up in Iron Age stratified contexts (Armit 2012). Three of the head skeletal fragments and two long bones have peri-mortem fractures (Armit et al in prep. 2013). Only one of the bone fragments displays deliberate modification: a human cranium fragment with an ancient and very straight edge, cut using a blade in swift motion after the death and decomposition of the individual (CCC) (Armit et al in prep. 2013) (Figure 19). Indeed the act of slicing this cranium fragment may have been analogous to cutting the heads off crops during the harvest (Armit 2012: 102), and indeed in harvesting and in the instance of this modified cranium fragment either a sickle or a sword could have been used. Children in Bali get their hair cut on their birthdays (a transition rite), in the same way that the top few inches of rice are cut off when they are transplanted after gestation (Howe 1991: 456). The Iban from Borneo believe that both the head and the penis were containers of seed which yield agricultural crops and human life (Armit 2012: 57-59). This fragment was found in a midden layer in the Inner Ditch (its phasing is uncertain because the context was not well recorded).

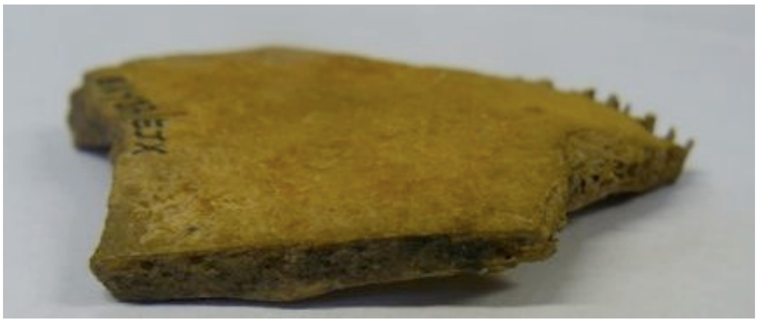


**Fig.19:** Modified cranium fragment (No.11) from Broxmouth (Tucker forthcoming). The straight edge is an ancient discoloured cut. Disarticulated human bones were likely curated objects. It was found in a midden layer in the Inner Ditch. (photograph: M Maxwell)

All disarticulated human bone fragments were of portable size, and although no other evidence for modification was detected, the one example is clear evidence of the deliberate curation of these remains and supports the idea that these were objects involved in networks of engagement. Five of the fragments were dated, and they span a wide range of 770 cal BC to cal AD 130 (SUERC-24258 up to and including SUERC-24262).

The crouched burials in the interior are further evidence of the curation of ancestors at Broxmouth. An individual was placed in a pit outside the entrance of House 2; though no stratigraphical link can be determined, this individual pre-dates House 2 by at least a generation (Burial 2, Figure 20 and Appendix 4). Another two individuals were interred, one in a pit burial to the south of the paved Area 8 in the centre of the Phase 6 settlement (dated to 730 - 390 cal BC), and another in an orthostatic cist structure in one of the south-west entrance ditch terminals (dated 370 - 110 cal BC). It is highly probable that the individual buried in the area of House 2 was defleshed before burial, because photographs taken at the time of excavation show that the lower limb bones were physically touching in a very tightly flexed position (Armit et al in prep. 2013) (Figure 20). This is evidence that the dead were maintained in networks of engagement above ground for extended periods of time before deposition and burial. Indeed, burying the dead seems to be an occasional circumstance due to the general lack of inhumation evidence in the Iron Age of

**Fig.20:** Burial of an individual outside of House 2, Phase 6 at Broxmouth. The head has been lost due to ploughing. This individual, probably a female, dates to 750 - 400 cal BC. She was aged 18-25 and had peri-mortem trauma on her right arm and hand and a fracture to her lumbar vertebrae and was interred in a very tightly flexed position perhaps suggesting she was defleshed (Armit et al in prep. 2012). (Broxmouth Hillfort Project archive 1977-78)

BOX 1

## Deliberate heating of bone and antler

Some artefacts of bone and antler at Broxmouth are unnaturally evenly black and shiny (Appendix 5), like this antler dome *above top* (DKW). These are skeuomorphic of shale domes, for example these examples from Traprain Law (*left,* GV 326 and *right*, GV 1445). An experiment was carried out to determine whether deliberately heating antler could have caused this colour change.

Two sawn tines from cast antlers were placed in a furnace at 300ºC and 600ºC for different periods of time. The antler was sawn prior to and after heating to determine properties of hardness and texture.

***Sample 1*** - 600ºC, 30 mins.
weight before: 7g
weight after: 2.4g
hardness before: very hard.
hardness after: extremely brittle, fractured longitudinally in half.
texture before: smooth but uneven
texture after: highly smoothed and polished.
colour before: cream/ white with brown cancellous bone core.
colour after: black in cancellous core and evenly grey-blue on surface.

*Sample 1 before and after heating in furnace.*

***Sample 2*** - 300ºC, 2 hours.
weight before: 0.3g
weight after: 0.1g
hardness before: very hard.
hardness after: quite brittle, fractured transversely in half.
texture before: unevenly smooth.
texture after: highly smoothed and polished all over.
colour before: cream/ white with brown cancellous bone core.
colour after: chocolate brown evenly all over surface, darker in cancellous core.

*Sample 2 after heating in furnace.*

**Interpretation**
Controlled high temperatures were required to turn the surface of antler evenly black. This suggests that fragments of antler were heated deliberately, perhaps not in the domestic fireplace but in pits or furnaces. Heating antler in this way also created an extremely smoothed and polished surface, but at the same time reduced the property of hardness making it brittle. The colour and enhanced surface qualities were sought after at the expense of strength properties.

*A bone point from Ghegan Rock (HD89) with black core and shiny black outer surface, brown in some areas. This was probably deliberately heated at a temperature between 300-600 ºC*

(photographs: M Maxwell)

Scotland. In the British Iron Age, deposits of human remains often occur in liminal contexts of settlement boundaries, closing deposits and in foundation or closing episodes of pits; Bradley (2005), Fitzpatrick (1997: 79 and 82), Hill (1995a) and Parker-Pearson (1999). The appropriated disarticulated human are boundary objects, transcending the world of the living with the world of the dead. The grave of the female, interred prior to the building of House 2, respects the entrance of this structure and therefore may have been a foundation deposit (Büster et al in prep. 2013).

### 4.4 Perceived affordances

#### 4.4.1 Colour, texture and smell

Naturally worked animal bone in colour ranges from milky-white, beige-brown to milky-yellow. with beige, dark and muddy brown-black speckles. Roe-deer antlers are darker and naturally grey-black in colour. Both worked animal bone and antler have in some cases been deliberately treated to be jet-black, black-grey, grey-blue in colour (listed in Appendix 5 and Box 1). Experimental work was carried out by the author to discover the conditions required for this colour transformation. The results of this experiment are given in Box 1 and it is clear that controlled high temperatures were required for this polished black surface to be achieved.

Additionally, the use of controlled high temperatures between 300-600 ºC enhanced the smoothness of the bone surface (Box 1). The surfaces of animal bone and antler are naturally hard, greasy, smooth and glossy and were further polished through use. It is also possible that some objects were waxed or varnished with a substance such as animal fat or beeswax to enhance their smoothness and gloss. Naturally in normal dry conditions fresh animal bone has a greasy fatty smell whereas antler has no noticeable smell. This changes when antler is soaked in water or raw milk for two weeks (Box 2) in order to make it easier to work, the liquid in which the antler was sitting smelt “horrible” (as described by a participant in one of my soaking experiments), but this did not linger. Soaking antler in water or milk also bleached the colour of the antler surface. Soaking, which leached these colour and smells from the antler, could have been regarded as having a purifying affect.

The colour changes of antler and bone may have reminded people of their fleshy substance and mortality. The colour black is often associated with darkness, mystery, savagery and the wilderness. This may be a reason why objects made from wild deer antler were deliberately heated to be black in colour. The use of a vegetable based charcoal black pigment was detected on the decorated drum GDC (Maxwell et al 2012, included in Appendix 10). A similar black pigment layer was noted, after examination in the national museum of Scotland, within the motifs on the decorated bone comb from Ghegan Rock (HD 78). Also, when the disarticulated human bone fragments from Broxmouth are looked at under the shine of natural sunlight they glow a luminous red/ pink, highlighting their internal vein structures. There is one object in the artefactual bone record, a perforated pendant (GNQ) identified as made from animal scapula, which shares this same property of glowing red when catching the light. This object was worn or suspended and would have cast a red glow on the surfaces it shone onto. This glow would have been more effective with the flickering light of fire, perhaps reminding people of mortality/ life, blood and violence. Giles (Giles 2008: 72-74) has revealed the power of the colour red in her work examining the ability of Iron Age art motifs to ‘entrap’ and ‘ensnare’ enemies in violent encounters, discussed in more detail in Section 7.3.1.

### 4.4.2 Signative

As already demonstrated antler may have had cosmological importance as a powerful means for conceptualising the passing of time and renewal in the Iron Age. Additionally its working and use may have been involved in belief systems of purification, fertility, wilderness, sexual prowess and masculinity. Today in Chinese medicine, a perceived affordance of deer antler velvet is its purifying medicinal qualities. Increased strength and sexual energy are noted as side effects of taking antler velvet as a remedy or as a health food (Price and Allen 2004: 813; Suttie and Haines 2001). It is possible that velvet was similarly used by people at Broxmouth in the Iron Age for healing and regenerative qualities, evidence for which would be absent from the archaeological record.

The signative power of working and using antler is supported by its relationship to metalworking. Hallén has noted the presence of copper-staining and intense heating on similar worked bone and antler assemblages from the Iron Age sites of Foshigarry and Bhac Mhic Connain in the Western Isles, suggesting an association with metal-working (Hallén 1994: 196 and 203). Some of the antler objects from Foshigarry and Bhac Mic Connain have evidence of burning and copper-staining, concentrated on the tips of points (ibid.:205 and 207) and irregular patches on splinters (ibid.: 228). Traces of intense heating can also be found on 11 of the Broxmouth antler fragments, particularly concentrated on the antler tine tips. Metal-working took place in peripheral zones in the hill-fort, most often near entrances (Hingley 1997), areas of access and egress. The vast majority (94%) of Middle Iron Age iron currency bars from settlement sites are found in close association with settlement boundaries (Hingley 1990: 101). At Broxmouth there are fragments of furnace walling, part of a crucible and other evidence for metal-working next to the west entrance to the hillfort (Figure 9). The recorded context description for the fragment of crucible (CEJ) states that it was "also associated with worked bone, antler, small bronzes", but the exact finds this is referring to cannot be ascertained (context register). Antler is associated with slag and bloom in midden deposits on site at Broxmouth (Section 4.6). The colourful transformations which take place during metalworking is understood as a boundary act, altering states of being from one thing to the next (Hingley 1997: 11-13). This may explain how disarticulated human remains from Broxmouth often ended up in ashy midden deposits on-site (Armit et al in prep. 2013). Other metal working sites in peripheral locations are often associated with human remains. Activity at High Pasture Cave was closed with the blocking of the stairwell which included the remains of an adult woman, a group of bones from a prenate or baby only just born and a human fetus (Birch and Sinfield 2005). A human cranial fragment and a parietal bone fragment from a child were found in the archaeological deposits at Borness Cave (Clarke 1878: 675). Despite the rare finding of human remains in archaeological deposits they are found at the cave sites in East Lothian; non-specified human bone fragments at Seacliff (Laidlay 1868-70:374), a human radius in Cave 2 at Archerfield (Cree 1909: 258), and non-specified human remains including bones from two children at St. Baldred's Cave (Layard 1934, Sligo 1857). No evidence for metal working is recorded at these sites although there is a splinter of antler beam working debris from Archerfield (X-HR-529) which has metal staining on its surface.

Metal objects are thought to be cosmologically associated to the agricultural cycle (Hunter 2007: 79, Hingley 1992: 23–4, 38–9). The manufacture of metal included a range of organic fuels including agricultural by-products, and coal fuels, which may have been tilled from the East Lothian soils (Chapter 7), and this becoming may be referenced in its decommisioning; by the act of depositing an iron sickle in a souterrain type feature as recorded at Dryburn Bridge (Hunter 2007:79). These underground longitudinal tunnel features are thought to be for the storage of crops and produce (Dunwell 2007: 106, Armit 1999: 582-83, Alexander 2005). Hunter cites examples of metal agricultural equipment deposited in significant contexts elsewhere in Iron Age Scotland; as a foundation deposit at Milton Loch Crannog, Kirkudbrightshire, or included in hoard contexts in Roxburghshire at Eckford, Carlingwark and Blackford Mill (Hunter 2007: 79). Metal artefacts, antler artefacts, and crania fragments were boundary objects enmeshed with ideas of fertility, death and renewal (Chapter 7).

The experiences of working with antler and metal materials, particularly in reference to worked antler, are found in mythology. Horns including antlers, were symbolic of gods, fertility and virility in British belief systems and folklore (Green 1997: 120-121, 198-199, 59-60). The Romano-Celtic god Cernunnos literally means ‘horned’ or ‘peaked one’ and in Romano- British iconography it is depicted as a human figure with antlers and deer ears protruding from the head (ibid.: 59). In Britain, iconography associated to Cernunnos appears in the Roman Iron Age, at Cirencester on a stone relief and at Petersfield in Hampshire (ibid.: 60). Gods were believed to have the ability to shape-shift and this is documented to have taken place during the festival of samhain celebrated at the end of summer and beginning of winter (ibid. :186), when the last of the crops would be harvested and the livestock were taken in from the fields. Although


**Fig.21**: *Above* a perforated antler tine (ELL) which has been deliberately blackened in colour. *Below* a tine with incomplete perforation made from lignite/ shale found at Luce Sands. Both tines are highly polished, but show no surface damage. (photographs: M Maxwell and National Museum of Scotland)

caution must be exercised in interpreting the text and iconography of the Later Iron Ages as representing actual enacted belief systems, at least they illustrate the dominant presence of the stag and other horned, lively and dangerous beasts, and their role in superstition. These depictions will in part have originated from previous reverence of the stag in the earlier Iron Age if not previously. The signification of antler is attested in the Broxmouth assemblage; for example the personal objects of the decorated antler drum GDC and its extended, cherished biography (Maxwell et al 2012, included in Appendix 10); and the cross decorated antler ring (FON) (Box 3). The perforated tine from Broxmouth (ELL) and the skeuomorphs made from antler tines (they are made of cannel coal/ shale/ lignite) with incomplete perforations from Luce Sands, Dumfriesshire illustrate the amuletic qualities of antler (Figure 21). These are all personal ornaments worn close to the body, embodying the agency of deer; in this sense acting as boundary objects allowing a person to be part deer.

### 4.4.3 Pragmatic

Bone in general, including antler, is efficient to work as it requires a limited crafting technology (Section 4.5.1). Antler in particular, was valued for its flexible workability (MacGregor 1985: 25-29), its ability to absorb shocks and potential for many uses. Partially worked beams and tines show layered episodes of differential manufacture and use-wear, sometimes involving fire or intense heat. Splinters which originated from bone and antler working and manufacture debris were then used as scrapers, polishers and points, effectively exploiting their flexibility, durability and plasticity.


**Fig.22:** Two points from Broxmouth with their medullary ends present (FTY *top* and CBG *bottom*). (photographs: M Maxwell)

In many cases diagnostic parts of animal bone are visibly present, often the medullary ends or femur heads remain unaltered on otherwise highly worked bone points (Figure 22). Long bones and metapodial bones were favoured for the manufacture of robust and narrow points (Table 3). Thin splinters of long bones were also utilised as points and for scraping or rubbing (Table 3). The biological properties of elasticity and strength of animal metapodial and long bones is comparable to modern day fibreglass (MacGregor 1985: 23) able to withstand high levels of compressive and tensile stress. Additional to their strength properties, these bones were valued for their natural longitudinal petite and light-weighted but dense forms, all of which were qualities affording delicate yet strong designs and uses for intricate, dextrous but vigorous activities including textile and hide working and personal adornment (discussed further below). Perforated objects, perhaps whorls, were made from otherwise unworked epiphiseal ends of cattle long bones (CTH, FZN, FNZ, DHO and EAH). Sockets for handles were most often carved out from the cancellous bone, much easier to bore into or to perforate than hard bone. Scapula, which has a flat and very dense biological structure, were chosen to make perforated discs which were used as either threaders or pendants (GNQ, FET, ELP and DFZ). Facial and cranial bones were rarely chosen; there are only three objects (EAW, CXF and DYQ) of which two show evidence for bead manufacture, a perforated pig incisor (EAW) and cattle mandible (CXF) with a partially formed fusiform bead on the inter-clavicle (Figure 23), both of which clearly effectively exploit the longitudinal biological structure of the raw material and its extreme relative density in comparison to other skeletal elements. No substantially sized animal bones were appropriated (excepting the use of a whale epiphyseal disc for a drill piece or mechanical object), indicating that in general objects to be made from animal bone were to be small, light and highly portable, requiring delicate craftspersonship and intricate gestures. The natural form of the animal bone is showcased in all the above examples. Therefore the instant recognition of animal bone and its enculturated perceived affordances was embedded within everyday life. These objects have a humility (Miller 2005), an ordinate value, just like our modern day acceptance of sterling silver cutlery or bamboo chopsticks.


**Fig.23:** Evidence of bead manufacture on the inter-clavicle of a cattle mandible (CXF). The circumferential wear is very similar to that found on an antler comb tooth (DCB), see Figure 25. (photograph: M Maxwell)

## 4.5 Exploited affordances

### 4.5.1 Manufacture and modification

The presence of roughouts in the Broxmouth assemblage show that bone was worked on-site. All stages in the manufacture of antler drums are evident (EQU, BDS and GDC) and two yoke-shafted points are unfinished (EBD and DPC), one of which is broken (DPC) perhaps a reason for its abandonment. Evidence for unfinished artefacts of bone and antler elsewhere in East Lothian are present at Ghegan Rock (X-HD-98) and North Berwick Law (X-HR-740). Evidence for antler working is found at Archerfield, Dryburn Bridge and North Berwick Law. Re-working of bone and antler artefacts can be seen at Traprain Law (GV 1003) and Ghegan Rock (HD-78 and possibly HD-79) (Appendix 2).

Both worked bone and antler are naturally strong and durable materials particularly when dry (MacGregor and Currey 1983; MacGregor 1985). A recognised benefit of animal bone and antler is its flexibility, elasticity and bending strength, though this is reduced by a third when wet (MacGregor 1985: 27 and Box 2). Antler and bone have substantially more bending strength in the longitudinal plane than across the natural grain of the bone (MacGregor 1985: 28). These were recognised as qualities in the Iron Age since the manufacture of objects respected the longitudinal plane of the bone, such as the points (including needles and pins), perforated objects and even the splinters or scooped ends. Antler, however, can withstand more stress from forced strain before reaching breaking point than animal bone (ibid.). This could explain the preference for using antler to make combs (all combs at Broxmouth are of antler: FVY, DCB, ENH, EMI, DKU), handles and as working surfaces and tools used for grinding, polishing and other impact activities (discussed below). Antler is relatively more elastic and tougher than animal bone, with the ability to absorb more sudden impact (ibid.). Both animal bone and antler can be worked when dry or wet. When dry they are relatively hard materials and require much physical bodily effort and the use of sharp points or blades to be cut into, though antler when wet, due to the leaching out of collagen, is more comparable in hardness to untreated soft-wood and could be cut into with blunt points or blades (MacGregor 1985:64, Zurowski 1974 and Box 2). In experiments carried out by Evans (*pers comm*) a complete cast antler was soaked for two years after which it was far easier to saw using a stainless steel blade, like sawing through plasticine. However, the resulting surfaces were rough and flakey, especially when it dried (ibid.). So, although this method reduced the physical expenditure involved in manufacture, the precision of the incisions into the antler surface were lost using this method and this is not in agreement with the observed clean-cut nature of the incisions on the antler from Broxmouth and East Lothian. Yet, rough and abraded surfaces are observed on the Archerfield and Dryburn Bridge artefacts but this may be due to post-depositional conditions. It does not seem likely that people in the Iron Age of East Lothian soaked their antler in water for extremely long periods of time. Alternatively soaking in raw milk for shorter lengths of time (weeks, not years) may have been preferred (Box 2).

Worked bone and antler was carved, whittled, occasionally incised and decorated, and then subsequently shaped through use from abrasion with harder coarser materials or polishing from handling. There are manufacture striations from burins or thin bevelled points on many of the worked metapodial bones. Metal or flint blades, burins or points were used to chop, incise and cut into antler and animal bone. Sawing through antler

BOX 2

## Soaking antler

Antler may have been soaked before working, to make it more pliable, softer and easier to work with (MacGregor 1985: 65). Three experiments were carried out in order to see if this may have been employed in an Iron Age context.

**Method**

Sawn fragments of cast antler beam and tine were soaked in 300 ml of room-temperature de-ionised water and 300 ml of room-temperature unpasturised cow's milk for a period of 2 weeks. Another cast beam sample was soaked in 300 ml of warm de-ionised water for 4 hours. Weights of the antler fragments were taken before and after. The antler was sawn prior to and after soaking to determine properties of hardness and texture. Colour and smell were documented throughout with the help of participants.

***Sample 1: Antler beam soaked in room-temp de-ionised water***

weight before: 20.4g
weight after: 23.9g
hardness before: very hard.
hardness after: no change, but on day 10 when sawing into the antler beam surface the antler seems to bleed, the incision secreting light red/ brown substance.
texture before: smooth but uneven.
texture after: no change to texture.
*Colour*
After 1 Day: water is the colour of 'pee', light yellow/ brown. Some red leaching out of antler, 'blood' from the antler?
Day 5: water is bright 'blood red'. Bone is 'bleeding', from the cancellous bone.
Day 10: water is dark red/black colour. Antler itself is now light brown, with dark black/ brown cancellous core.
Day 14: water muddy dark red/brown. Antler surface is medium/ dark brown. Cancellous bone core very dark brown with black ring towards beam.
*Smell*
After 1 Day: no particular smell noted.
Day 5: smells! A 'rotting' smell, mainly from the water surrounding the antler.
Day 10: strong smell- putrid and rotting, 'disgusting'.
Day 14: slight smell of rotting. Not very pleasant, but does linger.

***Sample 2: Antler beam soaked in warm de-ionised water for 4 hours***

temperature: 91ºC, maintained by use of hotplate
weight before: 23.1g
weight after: ?
hardness before: very hard.
hardness after: the antler is actually now harder to cut into!
texture before: smooth but uneven.
texture after: the antler surface has turned powdery pink/ white and is rough, not as smooth. Brittle and powdery throughout.
colour before: cream/ white with brown cancellous bone core.
colour after: Is bleached whiter, and now with darker brown/black cancellous core.
Smell: During heating there was a gluey, rotting smell and this got noticeably stronger towards the end. The antler itself though did not smell when removed from the water.

***Sample 3: Antler beam soaked in room-temp unpasturised cow's milk***

weight before: 23g
weight after: 26.05g
hardness before: very hard.
hardness after: much easier to saw, like wood. When sawing through the cancellous core a pungent burning smell was released.
texture before: smooth but uneven.
texture after: smoother with slight sheen, cancellous core very spongy.
*Colour*
After 1 Day: milk has a light pink hue, and is marbled brighter red/pink surrounding the antler fragment. No colour change to antler.
Day 5: No surface colour change for antler, cancellous bone now pinkish-red to black/ brown in core and seems to be 'bleeding'.
Day 14: the milk has separated and is reddy/ brown to pink in colour with yellow creamy layer on top. Surface colour of antler is now evenly whiter. Cancellous core dark brown.
*Smell*
After 1 Day: a little cheesy, of sour milk, but not too noticeable.
Day 5: Cheesy, but not too strong.
Day 14: strong pungent smell of rotting and sour, strong cheese up close. The antler once removed smells only a little sour, and this quickly disappears.

*Sample 3 on Day 5, the antler itself seems to be bleeding from the core.*

Soaking in raw milk at room-temperature made the antler easier to saw into, whilst enhancing surface colour (making it whiter) and texture (making it smoother, with slight sheen). Soaking antler in water at room-temperature turned the antler brown, and over a period of 2 weeks made no noticeable difference to properties of hardness or texture. However, an experiment carried out by Evans (*pers comm*) where a complete cast antler was soaked in water for 2 years made the antler much easier to saw, like 'wood', though made its texture powdery and dull. Soaking antler in warm water made the antler brittle and harder to cut into. Soaking in unpasturised milk was therefore likely the preferred method to enhance the surfaces and colour of antler, making it easier to work.

Interesting colour changes were noted. At times the antler was seen to 'bleed', and the surrounding liquid turned red. Soaking was perhaps also seen as a purifying process, bound up with Iron Age cosmologies, due to the significance of the secreting smells and the colour red.

*Sample 1 on Day 5. The water is bright 'blood' red.*

(photographs: M Maxwell)

with a modern day stainless steel saw is hard work, requiring strength and dexterity, creating sweat, dust, heat and a smell similar to singed hair or melting plastic. The variable shape, texture and thickness of the cancellous core of antler beams and tines dictate the ease or difficulty of sawing and this explains the numerous exploratory cut/chop marks on the Broxmouth worked antler in order to find just the right spot for sawing through. The cut-marks into the Broxmouth and East Lothian worked antlers are clean, fresh and of varying thickness and depth suggesting that a range of metal or flint blades were used. There is clear evidence for the use of metal blades for working bone in the Broxmouth assemblage, due to the regularity and close spacing of the stria in the tool marks examined under an optical microscope (Figure 24). Laser scanning confocal microscopy has been used to characterise different tool profiles and marks on two Iron Age objects from Cave of the Speckled Horse and High Pasture Cave on Skye, proving the use of metal blades and saws (Cruikshanks in Evans et al forthcoming 2012). This technique works by using a high magnification range of 120x to 14,400x and by employing lasers to calculate the surface tomography between known highest and lowest points on the object surface to a resolution of 0.12µm, combined with

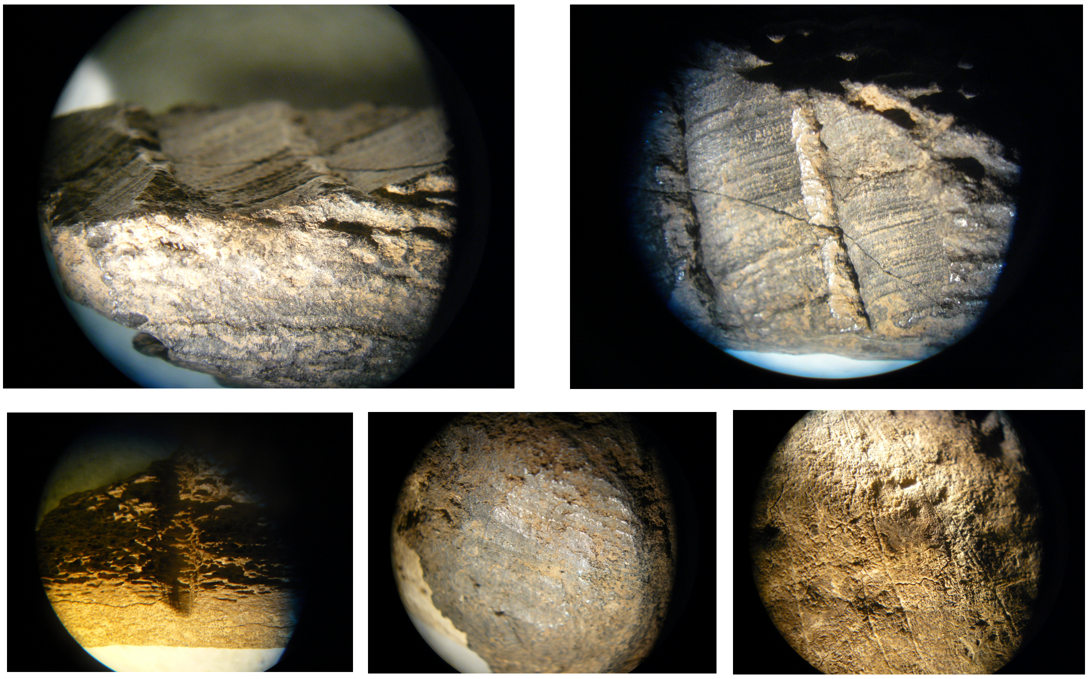


**Fig.24:** Photographs taken with a camera through the lens of a microscope at 10x magnification. The top two images show the characteristic metal blade chop marks with very close together parallel stria on an antler tine which has also been intensely heated black (FRA). Bottom left a blunt incision into the antler surface of an unfinished antler barrel (CYB). Bottom middle and right show the varied type of abrasion wear on antler pedicle smoothers or grinders. The middle object (FHH) has been heated black and has wide parallel stria and notable polish. The far right example may have been abraded by an organic coarse material, the stria are irregular and there is some gloss on high areas of the pedicle (DAY). (photographs M Maxwell)

microscope optical sections taken at defined intervals. This creates a three-dimensional surface map image of the object surface that can be manipulated and from which detailed measurements can be taken (Evans et al forthcoming 2012). In general the implements employed for working antler and bone need not have been specialised. However, analysis using a laser scanning confocal microscope of a decorated antler drum from Broxmouth (GDC) indicated the use of more than one compass tool, or a compass tool with changeable points (Maxwell et al 2012 (included in Appendix 10), Evans et al forthcoming 2012). More work of this nature on the worked antler beams and tines from Broxmouth would be beneficial.

Appropriated bones constrained object form. This is most obvious in the case of points, splinters and worked antler which, indeed, have seen little modification. In contrast, other objects have been highly modified; for example the standardised form of yoke-shafted points, antler domes and antler drums. In all these cases, the material used, the form, decoration and wear are clearly inconsistent with forms afforded naturally by the appropriated bone element, suggesting that these objects were designed and intended for particular purposes, in contrast to the multi-functional wear displayed on the points, splinter and worked antler. For example, analytical examination of the decoration of an antler drum (GDC) from Broxmouth using laser scanning confocal microscopy illustrates its pre-planned nature (Maxwell et al 2012, included in Appendix 10). Three-dimensional images of the antler surface show that where there was a natural buckle in the antler fabric the craftsperson did not adapt their design but forced the point of the compass through anyway (ibid.). The ring and dot motif design was clearly planned, but different motifs were incised over time and mistakes in its execution are evident. Additionally the motif was enhanced by application of a black charcoal pigment in the ring and dot motifs, determined using near infrared raman spectroscopy (ibid.).

*Skeuomorphs*

In occasional cases the fact that an object was made of antler or animal bone was not instantly recognisable due to high levels of working. The colour of 17 objects of antler or animal bone from Broxmouth, and a possible further four from other East Lothian Iron Age assemblages, were deliberately transformed to be jet/ shale-black by controlled heating, as discussed above (Box 1 and Appendix 5). These objects took on specific meanings and can be considered skeuomorphs. A skeuomorph is something that *is* whilst simultaneously something *it is not* (Knappett 2002). The material of antler in these cases was embodied within the object but masked and made to outwardly reference another material. The antler domes (DKW, DKX, EYQ, EYR), the perforated

BOX 3

## Skeuomorphs at Broxmouth

The original natural material of antler in these cases were made to outwardly reference another material and archetype.

This ring-headed pin (FXB) has incised parallel linear decoration around the ring. Ring-headed pins are traditionally thought to be pre-roman and natively produced in Scotland from the derived continental influences of sunflower pins from the later Bronze Age or swan-necked pins from the 5th century BC, made of copper-alloy or iron (Coles 1960, Stevenson 1955: 286; Piggott 1950, Fowler 1960: 163), like this one from Rhoads Links, at the base of North Berwick Law (FC 236) with cast linear and globular designs around the head. This antler example with yoke-shaft from Broxmouth is so far unique, but parallels well-known metal examples from Wessex and is most similar to examples with linear decoration on the ring from Woodeaten, Yorkshire (Kirk 1949, Harding 1972).

*The decorated antler ring (EXA,* above left*) from Phase 3 at Broxmouth is an early skeuomorph which references the Romano-British Broxmouth silver spiral ring (DCF,* above right*), Phase 6.*

This spoon (EIX) is a particularly fascinating example. Spoons on native sites are considered to be evidence of romanised habits in eating, the new adoption of table manners (Cool 2003: 28 and Chapter 6). A CuA folding spoon is known from Traprain Law (Robertson 1970: 219, fig. 9). However, the House 4 context for this spoon is pre-roman, found "tucked under JDL in layer 01", whose construction has been dated to at least 200 to 40 cal BC if not earlier (providing a *terminus ante quem* for the object) by the dating of infilling deposit sealing the base of the wall. The incised V chevron references the joint for a handle of a metal composite spoon. This suggests the existence of metal spoons, and 'civilised' eating habits, prior to Roman influence.


*Ring-headed pins.* Left *antler yoke-shafted/ hipped ring-headed pin (FXB) from Broxmouth with parallel incisions round the head, and cleanly broken off point.* Centre *illustration of copper-alloy yoke-shafted ring-headed pin with parallel linear design around its ring from Woodeaten, Yorkshire (Kirk 1949, 15, Fig. 4.1 and B15, Harding 1972, 170, plate 73M and S).* Right *projecting ring-headed pin from Rhodes Links (FC 236), with cast globular and parallel linear design around head.* Not to scale.

*Bone spoon (EIX) with pointed handle from a pre-roman context at Broxmouth. The incised chevron references a composite metal archetype.* Not to scale.

(photographs: M Maxwell)

tines (ELL (Figure 21) and GDV) and point made of antler (FRA) were heated black and highly polished, indexical in colour and smoothness to polished shale or jet. This treatment is also found on some worked bone points (FHH, FLC, FXJ, FXH). Heating damages the strength property of bone by leaching out the collagen and altering the biological structure making it more brittle (Box 1) explaining the post-depositional fracturing of three of the domes. The colour black was more significant than a need for strength. These objects were perhaps signifying inordinate value due to an obvious association to shale used throughout Iron Age Scotland for ornate objects: bangles, beads, rings and pins/ points. At the same time, however, shale was used for making what are often considered more pragmatic objects such as spindle whorls and further south, vessels and platters (also categorised as chopping boards) at Cadbury Castle, Somerset and Maidan Castle, Dorset (Bellamy 2000: 226, Wheeler 1943: 314-8). In fact, the blackened bone objects from Broxmouth show evidence of use-wear (one point (FRA) in particular shows heavy levels of wear) and so were not removed from normal spheres of everyday activity and considered purely ornamental. This again emphasises the artificiality of assuming object value.

In other examples of skeuomorphs made from antler and animal bone, intentional references are made to archetypal forms also suited to other materials. Three clear examples are the spoon (EIX), the ring-headed pin (FXB) and the antler ring (EXA) (Box 3). The spoon (EIX) has a V-shaped incised chevron at the point where the shaft of the handle meets the scoop (Box 3). Whilst decorative, the chevron references the point where one would expect to see a join on a metal, or a composite organic material and metal object. The spoon was found “tucked under JDL in layer 01” in House 4, whose construction has been dated to at least 200-40BC (GU-23354) if not earlier (providing a *terminus ante quem* for object) by the dating of infilling deposit sealing the base of the wall. This means it is pre-roman, which importantly disputes the commonly held idea that spoons are evidence of romanised eating habits (Cool 2003: 28). Similarly the ring-headed pin (FXB) from Broxmouth with incised parallel linear decoration around the ring, is a form more commonly found in metal (copper-alloy or iron) in the Iron Age. Ring-headed pins are traditionally thought to be pre-roman and natively produced in Scotland from the derived continental influences of sunflower pins from the later Bronze Age or swan-necked pins in circulation in the 5th century BC, made of copper-alloy or iron (Coles 1960, Stevenson 1955: 286; Piggott 1950, Fowler 1960: 163). This ring-headed pin made of antler is unusual: antler as a material used for pin manufacture is considered to be restricted to the Viking and Norse Period in Atlantic Scotland (Foster 1990: 150). This example from Broxmouth was found in Phase 4 dated to the later Iron Age in the latter half of the 1st millenium BC. The incised decoration on the Broxmouth antler ring-headed pin clearly references its metal counterparts (Box 3), as found on the cast linear and globular decoration on the copper alloy ring-headed pins from Rhodes Links, East Lothian, from Archerfield, East Lothian, four examples from Traprain, East Lothian (Burley 1995-56: 171 fig.3) and further afield one from Dunagoil, Bute (Piggott 1950: 130, fig.11) and at least six from Covesea (Stevenson 1955: 289, 290, fig. B). Similar parallel incised motifs, perhaps referencing metal decorative techniques, are also found on antler or animal bone yoke-shafted pins from Broxmouth (DJT, ENM, DCE, DKF (1), DKF (2)). Decorated pin shafts are thought to be a reliable indicator of a Late Iron Age date (Foster 1990: 151). Hipped pins are found across Scotland in the Late Iron Age into the Viking and Norse Period made of metal and animal bone (Foster 1990: 151), and although made of antler the ring-headed pin from Broxmouth has a hipped shaft and may be linked. This particular skeuomorph is therefore referencing a variety of other materials and pin designs.

Another example which is evidence of the link between metal and bone or antler is the discovery, confirmed by laser scanning confocal microscopy, that a compass tool was used to incise the ring and dot motifs on an antler drum from Broxmouth (GDC) and this is a technique normally associated with fine metalworking (Maxwell et al 2012, included in Appendix 10). The clear reference to metal working techniques and moulded decorative motifs re-enforce the link to metal archetypes. The decorated antler ring (EXA) from Broxmouth is another skeuomorph (Box 3) which references the Broxmouth copper alloy spiral ring (DCF), and other similar spiral rings found at Traprain (Burley 1955-56: 173-176) and elsewhere in south-east Scotland (Piggott 1950: 133, fig.13). Therefore, it is evident that objects normally found in metal were also made in bone (or possibly other organics which have not survived), and it is likely that this was a common practice in East Lothian.

At the same time, there are skeuomorphs which reverse the archetypal reference where the metal mimics the material antler, such as the iron deer antler from Traprain Law (Figure 67) (Burley 1955-56: 186 and Curle 1915: 196, fig. 44.1) and two partially perforated shale/ cannel coal isolated finds which strikingly resemble dear tines from Luce Sands, in Dumfriesshire, south-west Scotland (Figure 21). The tines from Luce Sands are remarkably similar in form and colour to the perforated and blackened tine, probably a pendant, from Broxmouth (ELL) and all show limited use-wear (except in the perforation of ELL) and high polish all over (Figure 21). Therefore, it is clear that shale/jet, bone and metal were used interchangeably for making objects. Metal blades were also used to manufacture shale objects (Figure 45). These materials were perhaps experienced as sharing similar qualities. It may be that the transformative powers of antler, metal and shale were of particular importance. As discussed above cast antler is symbolic of renewal and empowerment because of the association to the rut, and when soaked for working it gives off smells and secretes a bright red substance (Box 2). Working metal creates colourful fireworks transforming a material into a completely new substance (Chapter 7), and metal tools when sharpened or abraded create sparks. Jet, and to a less extent shale and cannel coal, have electrostatic properties and can slowly burn during which it gives off unpleasant smells (Allason-Jones 1996: 5-17). Jet was considered by the classical writers Galen and Pliny to have magical and curative properties including its use for treatments of the womb (Allason-Jones 1996: 15, Sheridan et al 2002: 824). These qualities were embodied in skeuomorphic objects with amuletic properties, and associated limited use-wear with high polish shows that they were cherished and removed from pragmatic spheres of engagement.

*Decoration*

Very few Broxmouth objects, and only four from East Lothian are decorated: a comb from Ghegan Rock (HD 78) and three from Traprain Law including two possible handles (GV 926 and GV 770) and an antler tine (GV 90). Appendix 5 lists the objects with decoration from East Lothian, all with common Iron Age motifs of ring and dot, cross, chevrons, dots and parallel lines. Decoration is limited to items of antler and often antler tines. An antler comb from Broxmouth (EMI) has parallel line decoration and one from Ghegan Rock (made of scapula or antler) (HD 78) is highly decorated with possible pigment in the incised design (examined first hand in the museum). Other items include points/pins, rings and handles (Appendix 5).

### 4.5.2 Use-wear: layered and curated

Use-wear on the animal bone objects includes abrasion on the edges, longitudinal scratch marks, irregular striations, polishing and light surface damage. Additionally, many of these objects are highly smoothed and have polished, blunted and abraded tips and edges, suggesting frequent handling and use. For example the multiply-perforated discs show many irregular striations and scratch marks and four combs (DCB, EMI, ENH, DKU) are broken, one of which (DCB) has evidence of repair. Combs have clearly seen heavy use; the teeth are blunted, heavily abraded and polished in all cases. Exposure to fire is evident most often on utilised antlers and points (Table 5). Out of the total Broxmouth worked animal bone and antler, 37% of the objects show evidence of ancient breakage, and in many cases this put objects out of everyday use (Table 4). Out of the broken objects, 21% are points (including antler/ animal bone splinter points) and 60% were utilised antlers (which show use-wear, but were unmodified prior to use). This may tentatively suggest that objects of antler were kept in use for longer than those of animal bone, although there are (as discussed) difficulties in species bone identification; particularly a problem for the points. Objects were generally heavily used and had long curated use-lives, before they were taken out from everyday use. Specifically on the points, wear is concentrated towards the proximal ends of the shafts. One point from Broxmouth (DCB) has chew marks on its head, perhaps it was held in the teeth while hands were busy or it was meditatively chewed. The series of longitudinal scratch marks on the points suggest repeated piercing into or abrasion with coarse fibres, as needles through textiles, clothing pins or basketry tools. Additionally, the variation in length of the points between 20-120 mm suggest a potential range in use, though of course limited by the natural form offered by the metapodial bones appropriated. There is one outlier and this is a point made from a tibia of a large animal with polished tip and shaft and with two oval perforations at one end (FXR), described as a possible spearhead in the catalogue (Hunter and Gerken in prep. 2013). Even including this outlier, each point is potentially suited to a range of tasks including threading, piercing, punching and adornment. 17% (16) of points were perforated and

BOX 4 **Layered episodes of use-wear on a cast antler (FWS)**

**Context**

The worked cast antler FWS from Broxmouth was found on a pebbled floor surface associated with a structure from Phase 1, during the pre-enclosure occupation phase of the site.

**Layered episodes of use-wear**

The brow, bez and trez tines of the antler beam were removed by chopping with a blade. The tip of one of the broken tines is highly polished, showing it was used after breakage. The other tines have no evidence for subsequent use. The removed tine tips may have been used for the creation of other objects. On the antler beam there are seven parallel cut-marks 10 mm long and 1 mm wide and an area of repeated impact on the beam above the coronet. The pedicle and coronet are both highly polished and smoothed. On the inner side of beam above the trez tine stump there is localised polish and wear, perhaps from handling.

**Interpretation**

This was an adaptable multi-functional object where hardness, toughness and durability were valued. This was a pounder, a likely animal hide smoother, a possible material resource and general work surface (perhaps providing an absorptive surface for incising holes in leather or textiles). This object therefore had a long biography, showing that antler was a valued resource. In the same context as this object, slag was also found suggesting a possible link between bone and metal-working taking place in this early structure. Metalworking, leather working and worked bone and antler working all likely took place in the same shared space.

(photographs: M Maxwell)

associated wear suggests suspension or threading. Additionally, 11% (10) of points had blackening, blue/grey mottling or charring concentrated at the tips usually combined with a high gloss indicating that they were deliberately heated to aid piercing into a substance, perhaps to punch holes into animal skins or to decorate, pierce, perforate or incise organic materials.

Caution in identifying the human caused use-wear on utilised antlers is necessary. Deer rub their antlers against trees and use them as weapons during the rut (Jin and Shipman 2010, Olsen 1989). When they are shed they are often gnawed by the deer themselves or other rodents (ibid.). Therefore distinguishing scratch marks and abrasion through cultural use is difficult (ibid.). Nevertheless, 53% of the worked antler from Broxmouth has evidence for intentional modification including either sawing, chopping and splitting off tines and beams or any combination of these. This is absent from the other 47%, which where unmodified prior to use. The varied and layered episodes of use-wear on the worked antler shows that these were adaptable tools that fulfilled a range of purposes (Table 6 and Box 4). Just over 21% (32) of worked antlers have impact damage fracturing the surface indicating use as pounders, while just over 10 % (16) have evidence of staining and/or residues, and this, in turn, is commonly associated with rounded, smoothed and blunt edges or points, perhaps suggesting a link to hide working and scraping which would leave an organic residue trace. Other crafts involving organic matter or residues cannot be ruled out. The burr pedicles frequently show evidence for use as smoothers or grinders (e.g. DAY and DJC) (Figure 24). Laser scanning confocal microscopy of the latter (DJC) discovered the presence of pollen on the pedicle surface and irregular stria in all directions, suggesting use as a grinder on an organic surface, probably for processing grains and therefore associated with the saddle querns on site.

8% (11) of the worked antlers display blackening and therefore involved in processes with heat or fire (Table 6). Hallén has noted the presence of copper-staining and intense heating on similar worked bone assemblages from the Iron Age sites of Foshigarry and Bhac Mhic Connain in the Western Isles, suggesting an association with metal-working (Hallén 1994: 196 and 203). Traces of copper staining and intense heating can also be found on some of the Broxmouth antlers, particularly concentrated on the antler tine tips.

Of particular interest are the tool and cut-marks and possible staining on the antler artefacts from contexts associated with the early pre-enclosure evidence for smelting in Phase 1 (discussed in Chapter 7, Section 7.1.2). Cinder, slag, faunal bone, artefactual ceramics and additionally thirty-six objects of bone and antler are found within the same contexts firmly associated within this phase of metalworking activity at the West Entrance area of Broxmouth. The worked antlers display layered episodes of use-wear, including varying combinations of chopping, incision, punch-marks, splintering, breakage and abrasion or polishing of the pedicles and tines (Table 6). Twenty of these worked and utilised antlers were examined under an optical microscope. Possible iron staining is noted on the beam of one antler fragment with beam and tines (FUR) and three chopped tines have been intensely heated and blackened by fire or high temperature (GAH, GNH and GNN). Possible copper staining is detected on the tine tip of an antler beam and tine junction fragment (GAJ) and red staining towards the tip of a tine on a fragment of beam with tines (GAO). The use of different metal blades is evident: an antler fragment has been chopped off from the beam which also has a series of neat thin incisions on it (FWT1). The chop marks and incisions have different natures of stria under the microscope, clear evidence that different tools were used indicating episodes of activity. Similar evidence for the use of different metal blades are also found on an antler pedicle, beam and tine fragment (GAN) and a burr and beam fragment (FWS). Metal blades of varying size, sometimes on the same object, were in use throughout this early period at Broxmouth. The staining, and perhaps the heating on the tines too, indicates that antler beam and tine fragments from this phase of activity were involved in metalworking processes.

Certain objects do not have evidence of heavy wear, but only show evidence for handling or adornment and are highly polished. These objects underwent different life biographies to those just discussed. For example an antler ring (EXA) is highly polished particularly on its inner surface, suggesting that this was a cherished personal object. Additionally two animal bone spoons (EIX, FXE), an antler ring-headed pin (FXB) and all of the yoke-shafted points show high polish but have notably limited evidence for use-wear. Interaction with these objects was controlled and it is likely they were personal objects or for display, removed from pragmatic spheres of engagement. Other objects without clear evidence for heavy polish from Broxmouth include a perforated scapula (GNQ), a perforated object of unknown species (FZR), a perforated pigs tooth (EAW), and two blackened antler tines (GAH and ELL) one of which is perforated (ELL) (Figure 21).

In general, patterns of use-wear and breakage found on the worked bone from the other assemblages in East Lothian are comparable, showing that they were involved in similar practices. Out of the total of all the worked bone assemblages from East Lothian combined, 63% of objects were broken before deposition. Worked antler beams and tines show layered episodes of working, impact, chopping, smoothing and abrasion.

Tips of points are polished, have longitudinal scratch marks or are broken. The two combs, both from Ghegan Rock, also show long biographies. The semi-circular antler comb (HD 78) has subsequent wear on the broken teeth showing that breakage of teeth did not put it out of use. The rust brown staining on both edges of two re-joining fragments of the second comb (HD 79) shows that it was either originally part of a composite comb or was mended with an iron staple. Overall objects of all forms show long biographies, suggesting that they were curated and retained in circulation for long periods of time.

### 4.5.3 Re-design and repair

There is evidence for repair or re-design on 4% of objects from Broxmouth (Table 4), but in reality it is likely that far more objects had extended use-lives. A socketed handle (EIY) was adapted by replacing a longitudinal perforation with a transverse perforation. Another example is the decorated antler drum (GDC), an offcut originating from a


**Fig.25**: Two combs with extended use-lives. The comb on the left from Ghegan Rock (HD-78) has a secondary perforation through the primary lunar and dot decoration. The comb on the right from Broxmouth (DCB) has two pronounced circumferential worn incisions 50mm apart on just one of the surviving teeth and it could be that this is evidence for bead manufacture, or use as a threader or spacer in weaving (known as a 'heddle'). The stem-like handle has also been repaired on this comb, while breakage of one of the teeth did not put it out of use. (photographs: M Maxwell)

larger artefact; at some point it was deliberately broken or snapped off and then perhaps retained as a keepsake or momento threaded onto a necklace or bound into clothing, the interior of the perforation is worn, as documentation of its personal value. This comb was designed to be used to beat the weft of the weave down. The stem-like tail was repaired of a comb (DCB), and even the breaking of one of the teeth did not put this object out of use; illustrated by its subsequent blunting. This same comb (DCB) also has two pronounced circumferential worn incisions 50 mm apart on just one of the surviving teeth and it could be that this is from re-using the comb for bead manufacture (the teeth are the right size and shape for making beads) or use as a ‘heddle’ in weaving (the thread was wound around a tooth to keep it separate from the weft until it was to be incorporated into the pattern) (Figure 25).

The majority of Broxmouth worked bone and antler artefacts had long biographies (Section 4.5.3). Worked antlers show multiple functions and episodes of use (Box 4) and those which do not display more than one type of wear are broken, chopped off fragments (often tines) or manufacture debris. Chopping and splitting off tines and parts of beam of worked antlers provided resources for other objects, and provided the many utilised splinters in the assemblage.

From East Lothian re-use and re-working is evident on three of the artefacts. The comb from Ghegan Rock (HD 78), which displays heavy use-wear on its teeth, has a later addition of a perforation through a lunar motif (Figure 25). This suggests a change in use later in its biography; perhaps becoming a pendant. Additionally, a rust coloured substance was detected around the area of an old break on two conjoining comb fragments from Ghegan Rock (HD 79) from its possible repair using a metal staple. The final example is a fragment from a bone scooped point found at Traprain Law (GV 1003); at the point where its shaft broke off are traces of three chop marks, suggesting that this break was deliberate.

**4.6 Deposition**

Worked bone can be located to context and general area at Broxmouth, but unfortunately no identifiable worked bone artefacts are recorded on plan or section. Only 7% of worked bone artefacts were found in disturbed topsoil and ploughsoil contexts, and three objects were recorded as affected by animal disturbance, all of which were in House 7 (recorded in the context information for find GLO). The disarticulated human bone were badly recorded; the structured deposition of disarticulated human remains in Iron Age contexts was not generally recognised in pre-modern excavations.

The majority of worked bone ended up in midden deposits and spreads in the Inner Ditch, Area 8, the south-western and Eastern entrance areas. Additionally, the Broxmouth plans suggest inclusion of bone and antler objects in house backfilling events. A clear example is in House 4, Phase 6. Two thick layers of "greenish" humic soil were recorded as abutting the last stage of walling of House 4 (context JDP) and in the site notebook (site notebook labelled BH77/BAC, page 15) it is written that "around the porch area extending from paving are patches of dark soil which appear to thickly overly the subsoil, could it be refuse swept out of the house? ". Since this deposit overlies the subsoil, infilling occurred after abandonment. The date received from between the paving of House 4 before this last infilling event is 0-210AD (GU-23355), whereas dates from the terminal infill itself range from 400-50BC (GU-23356 and GU-23357). This securely demonstrates the use of old midden to close this structure. Objects DKW, DKX, DLA, DKQ, DKU are likely part of these rubble and midden infilling contexts in House 4.

As already mentioned, few worked bones were found in secure contexts except in the interior structures where this is better recorded. A small antler mount and possible composite part of a comb, is recorded found in a terminal posthole in House 5 (FFQ), Phase 6. Six objects are clearly recorded found on floors of structures (FXB, FXU, GAJ, GAL, NOT GIVEN and GAI). A further 12 objects were found in pits in the houses. Objects in pits included a re-worked antler handle (EIY), a long-handled antler comb (EMI), four points (EMS, EMS(2), EYL and GAP ), three antler tines one of which is longitudinally perforated (EMK, EYQ and FCF), a fragment of a blackened dome made of antler (EYR), a perforated scapula, probable pendant (FAZ) and finally a sawn cattle radius shaft (CFM). In the same large clay-lined pit (context JIS) in House 4, sealed by the upper stone of a sandstone rotary quern (DPL), three bone objects (the perforated scapula disc (GNQ), probable pendant (FAZ), the longitudinally perforated antler tine (EYQ) and the blackened dome made of antler (EYR)) were found alongside a limestone mortar (FBK) in the same infill. All the bone objects found in this context could have been used for adornment, on clothing/ bodies or on composite objects (in the case of the dome as a pin head, for example). A splinter (FEI) with no traces of having been burnt, was recorded as found immediately beneath a hearth and within a mixed loam and ash deposit (JIU02). Otherwise worked bone objects in the interior were found within collapsed and/or deliberate infill rubble contexts and wedged under and between walls and paving, suggesting the cleaning of floors, loss or *ad hoc* discard. However, cacheing away objects in some instances in hidden places or inclusion in closing and foundation deposits in the structures cannot be ruled out. One object (EIX) was clearly described as “tucked” under a wall (context JDL) in house 4 in the context records. Nevertheless, from building contexts there are four examples of points which have gnaw marks and their distal ends chewed off (FAZ, CWF, GBR and CIQ) suggesting that they were left exposed, maybe a product of the use of old midden to infill structures (as demonstrated for House 4). The only other example of a worked bone object which has been clearly chew or gnaw marked is a point (DVN) from an ash/hearth deposit in Area 10 in the Inner Ditch.

The middens also include metal-working debris, pottery, charcoal and faunal bone. In the Inner Ditch the worked cast antler (FWS) with multiple use-wear (chopping, smoothing and polish and breakage) was placed under a slab on a pebbled surface (context OFK) near by Area 10, and in this same context slag and bone were also found suggesting a link between bone and metal-working, or the use of bone tools in metal-working associated activities taking place in this early structure (Box 4). This link is evident on the metal staining found on worked antler beams and tines from associated contexts to the early pre-enclosure metalworking activity at the West entrance area of Broxmouth (Section 4.5.2). A splinter of antler beam working debris (X-HR-529) from Archerfield, East Lothian, also had metal staining on its surface.

Significantly, breaks on some objects were clean with no subsequent use-wear and therefore these objects appear to have been sacrificed (e.g. the decorated antler drum (GDC) discussed above) before their deposition; an act taking them out of their previous everyday pragmatic use-lives to take on new significances. The highly polished ring-headed yoke-shafted point (FXB) found on the floor of Structure C in the Inner Ditch, Phase 4, shows a clean break towards its tip (Box 3) which could be from use, although clearly it was not used again for any notable length of time as there is no subsequent wear on this broken surface. An antler ‘pick’ (FWS) was found on a pebbled floor surface associated with an abandoned earlier structure associated with metalworking in Phase 1. It is possible that the beam and tines of this object were deliberately broken putting it out of use before abandonment of the structure (Box 4). A small bone point (FBP), found between the knee on top of the chest cavity of a female skeleton in a stone grave burial in the south-western entrance area (context BBO), with clear manufacture marks and use-wear was cleanly broken at its base. This object was well used, broken and then included as a grave good, the only definite grave good recorded at Broxmouth. The skeleton was dated to 370-160 cal BC (GU-18728). However, it is also worth mentioning the burial of the “venerable ewe” under a Phase 3/4 paved surface of the gateway at the south-western Entrance (dated 400 to 230 cal BC (GU-25007)). She was placed as a jointed carcass, wrapped in a de-skinned fleece in an irregular shaped scoop and she is one of the oldest ewe skeletons in the faunal assemblage (Cussans in prep. 2013). There are no signs of disease or injury on her skeleton, but notably she is missing bones from the extremities which are often appropriated as bones for working. This could be a foundation deposit at the gateway (ibid.). Sheep, and perhaps in particular female sheep, were regarded as a significant resource for the people of Broxmouth and therefore giving one up to the ground and removing her from pragmatic spheres of engagement would have been a powerful act.

Overall deposition of worked bone in midden spreads was normally in the ditches and interior areas at Broxmouth, with tentative evidence for occasional foundation and closure deposits. Middens were curated and used to infill houses, as the early dates of the midden infilling House 4 late in the sequence demonstrates. Worked bone objects of varied animal species, object forms and perceived or exploited affordances are found across all areas, although the group of personal objects in pit JIS in House 4, Phase 6, with limited use-wear on their surfaces except polishing from handling, is worth mention. Furthermore, for any type of worked bone and antler object to end up in archaeological deposits on-site was an unusual occurrence: the evidence for extended use-lives in combination with the fact that those which were uncovered show a high level of ancient breakage (Table 4) indicates that objects were recycled and up-cycled in circulation above ground until they no longer served their social functions.

The 22 disarticulated human bone fragments were found in a variety of midden and occupation deposits. Unfortunately the recording of the contexts was not undertaken in any great detail and as a result not all can be phased. Five disarticulated human remain fragments were found in Phase 6 contexts in the Interior; a left radius midshaft with peri-mortem fracture (an injury which occurred shortly before the death of the individual) was found in the terminal infill of House 7 (dated fragment No.1), a bone from the foot with no evidence of trauma in the ploughsoil just over House 2, a cranial fragment without evidence of peri-mortem trauma in an unspecified context in House 1 and two cranial fragments in the Stage 4 wall core in House 4 (including dated fragment No.14), one with peri-mortem trauma and the other without.

Seven fragments (an ulna, femur, radius, tooth, vertebrae, pelvic and crania fragments) were found in various midden contexts in the South West Entrance none of which had evidence for trauma. It is conceivable that these fragments are from the same individual, scattered across different contexts in this area, but unfortunately none of these fragments were dated. In the Inner Ditch four, including one with peri-mortem trauma, were in the midden over occupation (Phase 5) (including dated fragments No.6), one with peri-mortem trauma (dated fragment No.17) in the upper middens in the Inner Ditch (Phase 5/6) and the fragment with ancient cut-mark was found in an unspecific location in the Inner Ditch. The middens in the Inner Ditch are often ashy in nature. Furthermore, a fragment with peri-mortem fracture was found in a soil deposit 'sealing' the metalworking material in the Inner Ditch in Phase 1 (dated fragment No.10). One fragment with no trauma was found in the East Entrance, Phase 3. The last fragment, with no trauma, was not recorded within any context. In total five of the fragments were dated and gave a range from 760 cal BC to cal AD 85.

The deposition of the disarticulated human radius midshaft in the terminal infill of House 7 is argued to be significant in Chapter 6, since this is in the same context as refitting late prehistoric pottery sherds and a fragment of samian. The dating range obtained for this structure's terminal infill obtained from the human radius shaft 40 cal BC to cal AD 130 (GU-18739) is slightly earlier than the sherd of samian deposited here which dates to the early Antonine period (Greene and Cool in prep. 2013). This may suggest that the samian fragment was deposited here after the main episode of infilling, an act remembering the human bone fragment perhaps deposited up to a generation before, or that the human bone fragment was curated before deposition with the samian. Similarly, the House 4 deposit in which the human cranial fragments were found (one from the mandible) may have been a structured transitional deposit. This deposit also had within it two skeuomorphic blackened antler pedicle domes (DKX and DKW), a worked bone pin (DLA), a rim and body sherd from a Type 1 vessel (EKZ/X), two groups of sherds from a Type 1 vessel (EMZ) and another group from a Type 2 vessel (FCX, GNT, EZJ). On top of this deposit were placed, apparently deliberately, pieces of ox skull (Broxmouth Hillfort archive 1978, slide H4XG). This midden context sealed the intermediate Stage 2 occupation in this structure. Two faunal bones from the deposit were dated 200 to 30 cal BC (GU-23353 and 23354) whereas the human cranial fragment (No.14) was directly dated 50 cal BC to cal AD 90 (SUERC 24259). This may suggest that the disarticulated human bone fragment was deposited at the end of this intermediate infilling with the fragments of ox skull, perhaps as a foundation deposit for the next stage of occupation.

Contextual information is lacking from other sites' small comparative assemblages of worked bone and antler in Iron Age East Lothian. The majority of these sites were not subject to modern excavation methods (Archerfield, Craig's Quarry, Ghegan Rock, North Berwick Law and Traprain Law). Additionally, from Traprain Law, there are only 11 fragmented and well abraded bone and antler artefacts from an otherwise sizeable middle Iron Age to Roman Iron Age artefactual assemblage including pottery, metal and stone, illustrating that taphonomic conditions are an important factor affecting the bad preservation of bone. Nevertheless, there is evidence for structured deposition, for example at Dryburn Bridge the only two worked bone objects - a cast worked antler pedicle and beam, and a separate fragmented segment of beam with complete and incomplete perforations - were both found within the same pit (context O48), but unfortunately this pit could not be stratigraphically linked with the rest of the site (Dunwell 2007: 72). This pit had within it a range of artefacts: coarse pottery, three saddle quern uppers, three polished stones, fuel ash slag, animal bone (not worked) and chipped stone including a microlith (ibid.). The larger antler object was sampled and returned a date of 490-200 cal BC (ibid.). It is interpreted in the site report as a rubbish pit (ibid.), but it is not clarified whether the pit was infilled at once or in multiple episodes. Worked bone and antler deposition in mixed midden type contexts (including unworked bone, pottery and fire-cracked stone) associated with structures is inferred at Ghegan Rock (Laidlay 1868-70: 374-376). Similarly mixed midden deposits with worked bone and antler are associated with the infill of a possible round-house at North Berwick Law (Richardson 1907: 424).

### 4.7. Conclusions

Antler was seasonally harvested, whereas the species of animal bone used to make artefacts were available throughout the seasons from butchered animal domesticate carcasses and from middens. For instance, a perforated cattle tibia point (FZN) shows prior evidence of butchery at its epiphiseal end. There is some evidence to suggest that across East Lothian middens were stored, and perceived as resources for manure and materials in the Iron Age. The animal bone artefacts from Iron Age East Lothian are in general highly worked masking indicators of weathering and gnawing, but this lack of abrasion may in fact support the idea that they were included in carefully curated midden as has been argued for at Danebury (Fitzpatrick 1997: 79). Re-use of old bone from middens may not, however, be a universal practice in East Lothian since at Dryburn most of the faunal bone is fresh and quickly ended up as part of structured deposits (Thoms 1998: 91), however, there were no artefacts made of animal bone recovered from the Iron Age contexts at this site, despite the preservation of sheep/goat, cattle, horse and pig faunal bone (ibid.: 86- 91). Deer bones (not including antler) were not used to make artefacts, and pig rarely used (only four artefacts at Broxmouth), though this reflects the small quantity of these species recovered in the faunal assemblages from Iron Age East Lothian. This may also show that locally reared animals were preferentially selected for making artefacts as suitable for expressing local identities tied up with the agricultural cycle, since deer were wild and pig was imported into Broxmouth. Antlers were the exception since they effectively embodied beliefs of sexuality and fertility. There are no examples of animal bone objects which were decorated, whereas there are a number of decorated objects made of antler, including the perforated antler drum (GDC) with ring and dot motif decorated with more than one compass point and potentially by more than one individual. Resourcing animal bones from middens similarly embodied ideas of fertility, since middens were intimately linked to the agricultural cycle.

Artefacts of bone and antler were valued for their flexibility, durability and adaptability. Many of the artefacts have layered episodes of use-wear etched on their surfaces. The colours and texture of some antler artefacts were deliberately altered and skeuomorphs also clearly illustrate how these materials were experienced as metal and/or lignite in some cases, the latter both magnetic and electrostatic. Additionally, there is a demonstrated link between metal working and antler working; copper staining can be seen on utilised antlers associated with metalworking debris and slag found in Structure A in Phase 1 at Broxmouth, and a compass tool was used to incise decorated antler drum GDC.

Despite the availability of animal bone and antler for working and the general lack of investment in manufacture, artefacts were curated and had long biographies of use. They took on personalised biographies. Artefacts which show little use-wear have highly polished surfaces, which could be from manufacture, but also which could be from repeated handling showing that they were cherished.

Even when considering the fact that bone is rarely preserved in the ground, it is clear that objects falling out of pragmatic everyday engagements above ground was a rare occurrence. The worked bone artefacts along with two human disarticulated human remains and refitting pottery sherds from three vessels in the midden infilling House 4 between two stages of occupation are arguably structured deposits to enact transition (on top of these deposits were placed pieces of a smashed ox skull). Similarly a disarticulated human bone fragment, with refitting late prehistoric sherds and a sherd of samian, was found in the terminal infill of House 7. Otherwise artefacts of animal bone and antler, and disarticulated human remains are found in ashy midden in the ditches, in exposed spreads, and occasionally in pits. Perhaps they were deposited in these midden contexts in a manner embodying ideas of fertility and renewal, with the potential to be re-introduced into everyday engagements in craft, agriculture and metal working.

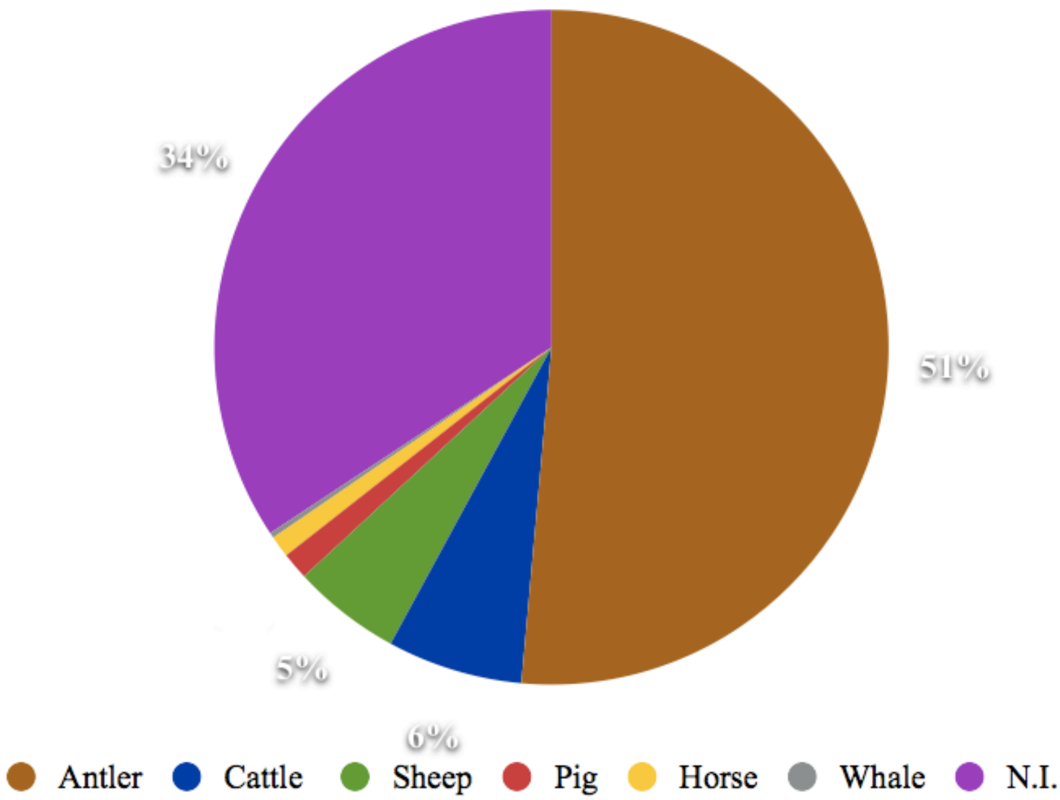



**Table 2:** Pie chart of the species represented in the worked animal bone assemblage from Broxmouth. This shows the dominance of red deer antler and the large proportion of bones which cannot be assigned to species. Other than antler the domesticates cattle and sheep were the most frequently appropriated. Pig, horse and whale bones were rarely used for artefacts. There is one possibly worked deer bone, but it is included in the category non-identified.

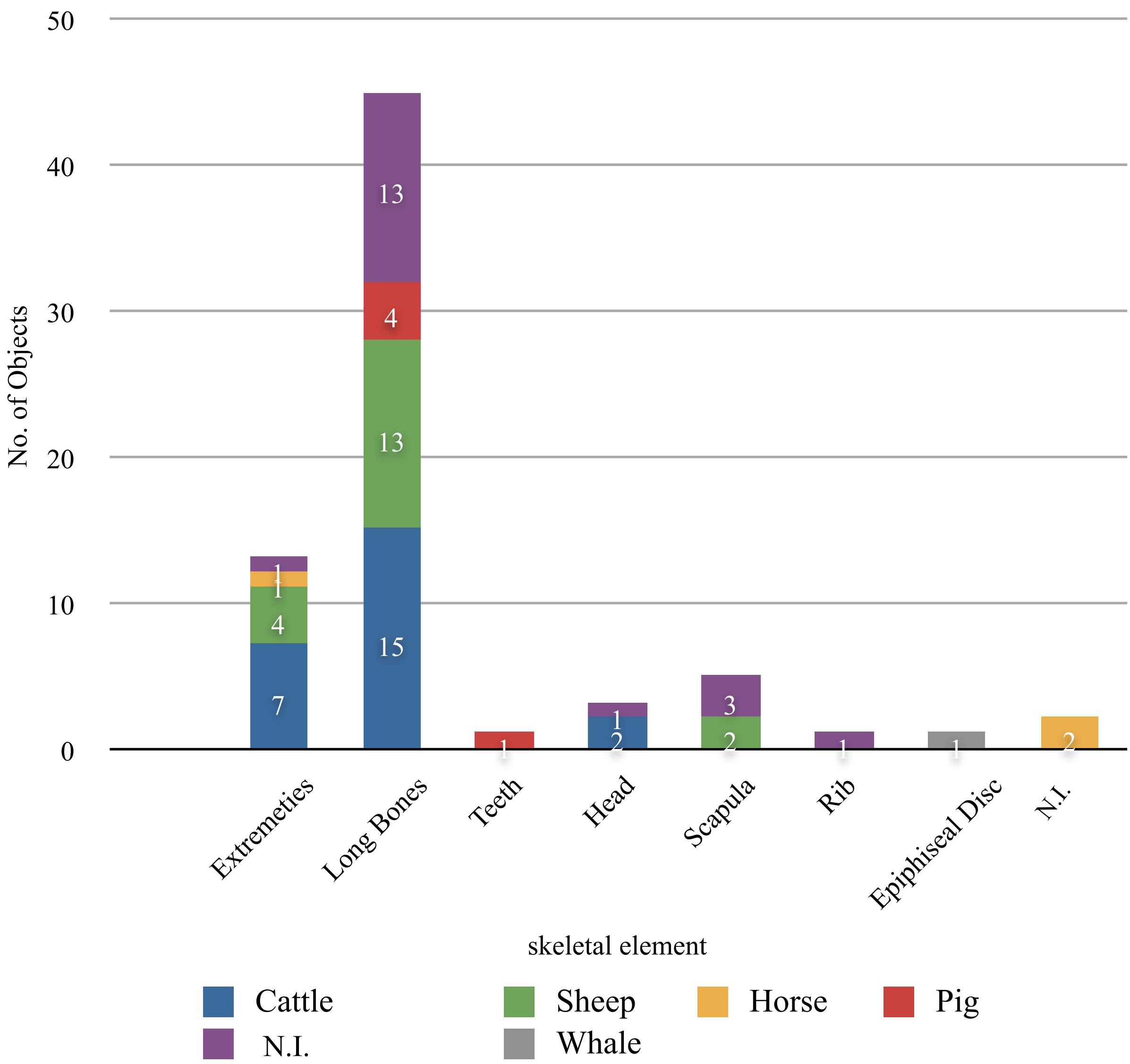



**Table 3:** Bar graph showing which skeletal elements were chosen from each species at Broxmouth. Long bones from domesticates cattle and sheep were deliberately appropriated and were the skeletal elements most often represented. Cattle and sheep extremeties were also frequently appropriated. Other skeletal elements were only occasionally appropriated and not as easily definable to species.

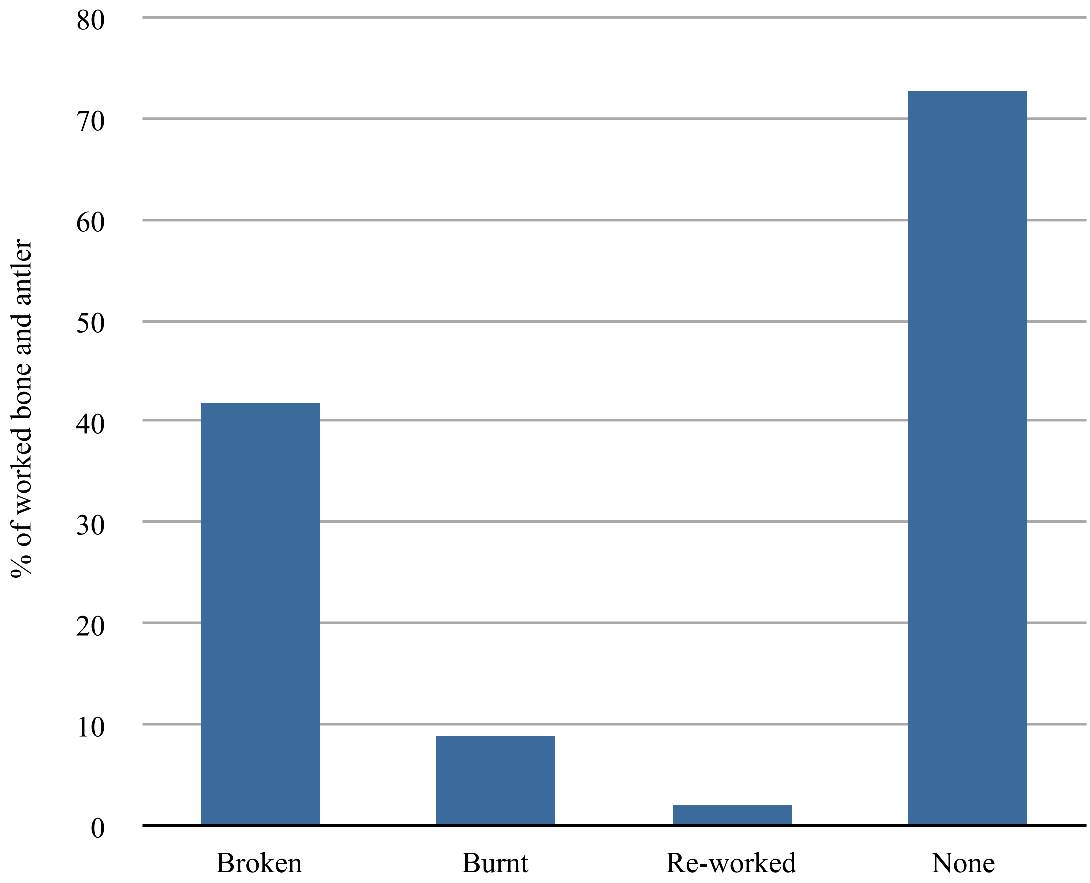



**Table 4:** The % of ancient breakage, burning and re-working found on objects made of antler and bone from Broxmouth. Burning refers to blackening, charring and mottling of the object surface from exposure to heat, in some cases this may have been a deliberate treatment to change the colour of the bone (Box 1 and Appendix 5), but in other circumstances may result from use; many points are blackened towards their tips and some antler and beams could have been involved in metalworking (Section 4.5.2). Re-working refers to repair and re-design of objects, but not to layered episodes of use-wear as this was universal. The category 'None' represents over half of the assemblage, but in some cases objects were too degraded or damaged to determine differences between use-wear from post-depositional wear. Breakage represents a large proportion of the total assemblage, showing that objects were recycled and had long use lives.

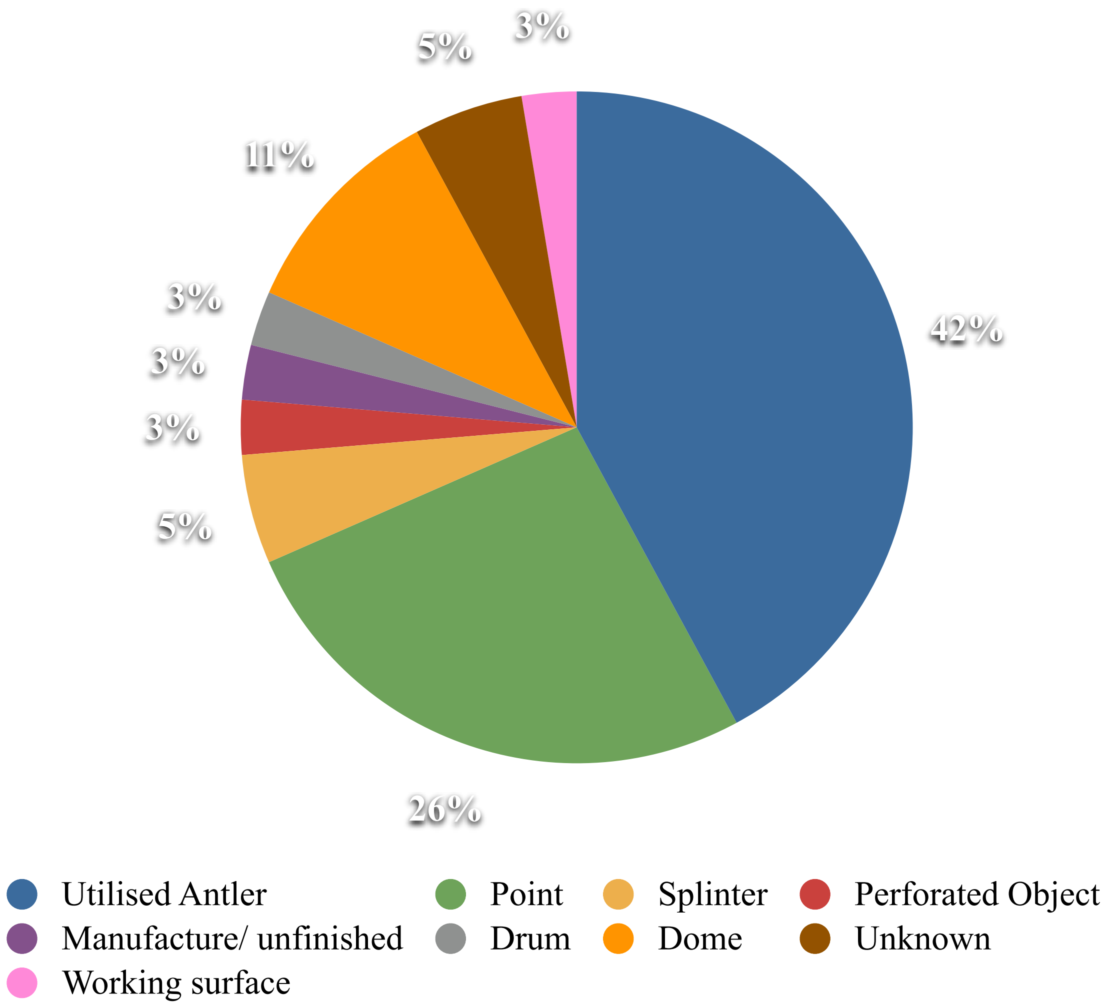



**Table 5:** Pie chart showing the objects of bone and antler which have evidence of exposure to fire of blackening, mottling and charring sometimes associated with fracturing. Most object types show evidence for exposure to fire, and perhaps it is not surprising that the utilised antlers represent the largest % of objects which were heated or burnt, since antler dominates the material culture assemblage as a whole. The next largest category showing burning are points and discolouration is concentrated at their tips. It is possible that some objects were heated deliberately (Box 1) to change their whole surface colour from cream to black, as in the case of domes and some points (Appendix 5).

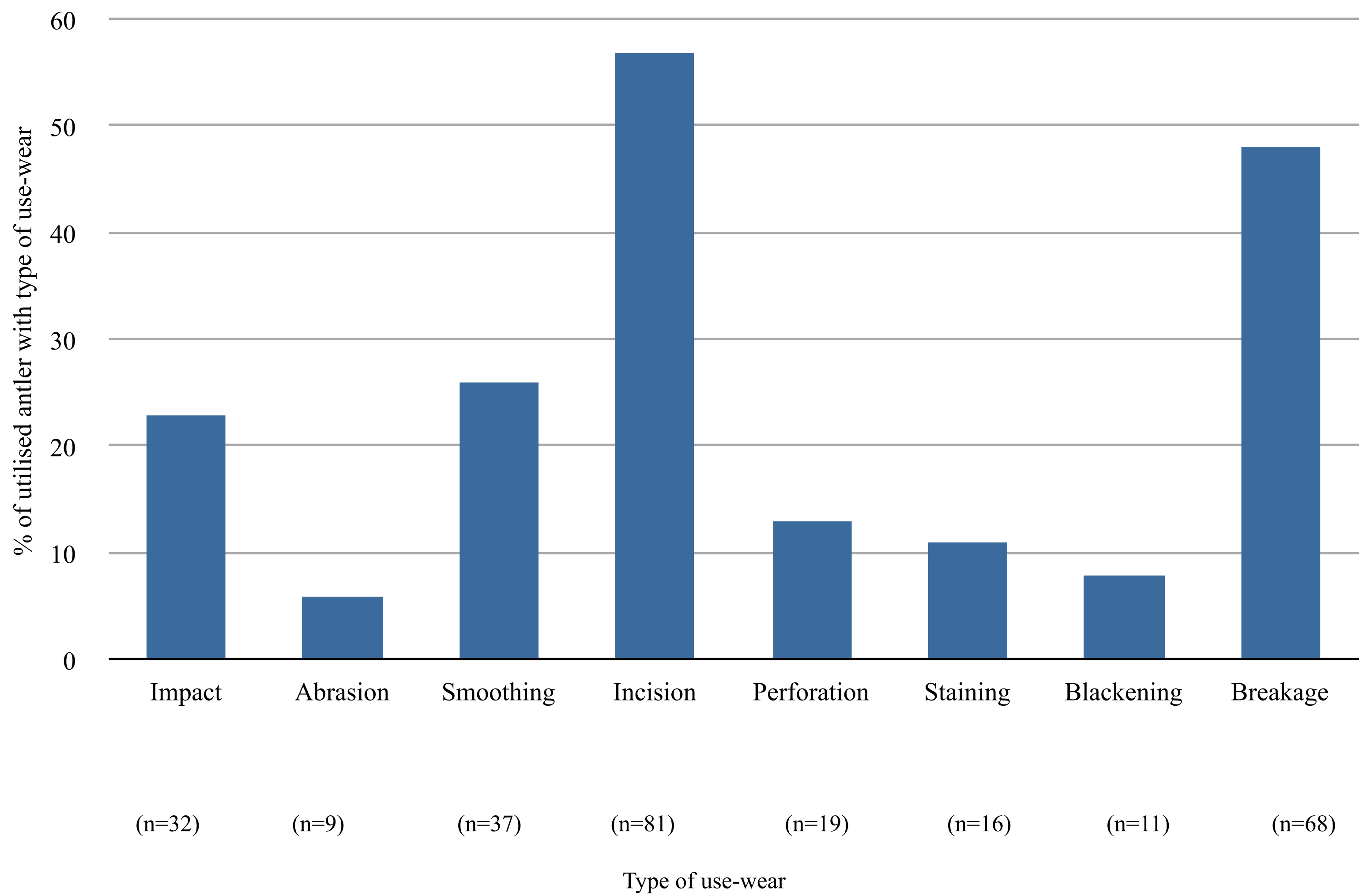



**Table 6:** This bar-chart shows the type of use-wear found on 142 (out of a total of 156, 14 unavailable to be examined) of the utilised antlers beams and tines (unmodified prior to use) which were examined under a microscope. Many of the antlers show more than one type of use-wear. The pattern of overlap between types of use wear is variable so cannot be meaningfully quantified. The most common types of use-wear found include incision from metal blades (chopping, sawing and cutting). Breakage is also common, and perhaps suggests these objects were also material resources. It is clear that antler beams and tines, even those that were unmodified prior to use, had long use lives showing layered episodes of wear.

# Chapter 5 Worked Stone

This chapter will follow a biographical structure to analyse the networks of engagement during social contexts of appropriation, use and deposition of stone objects. A study which examines the biographies and exploited material qualities of stone objects in contexts throughout the south-east Scottish Iron Age is so far lacking, thus, this will be a valuable contribution to not only understand their pragmatic role, but also their social role in the everyday.

The worked stone assemblages from Traprain Law and Broxmouth both stand out in terms of the quantity of objects (Table 7), however this is perhaps not significant since of all the sites analysed, these are the most extensively excavated. In fact, the number of objects recovered is actually small in terms of the everyday activities that they represent and the time depth present at both these sites. Approximately 670 objects of worked stone were found during the excavations at Traprain Law by Curle and Cree over six seasons from 1919 to 1923 (Curle 1915, Cree 1924). This site is located on a steep sided volcanic plug 216 meters above sea level meaning it has escaped plough damage. A relatively high recovery rate of archaeological material may not be considered surprising. At Broxmouth 289 worked stone and cannel coal objects were recovered (not including those which on re-analysis have been deemed natural), which is approximately less than half of one object found for every year of occupation at this site. The worked stone objects recovered thus represent only a fraction of what would have been in use, indicative that they accrued long biographies and that they were non-casually discarded.

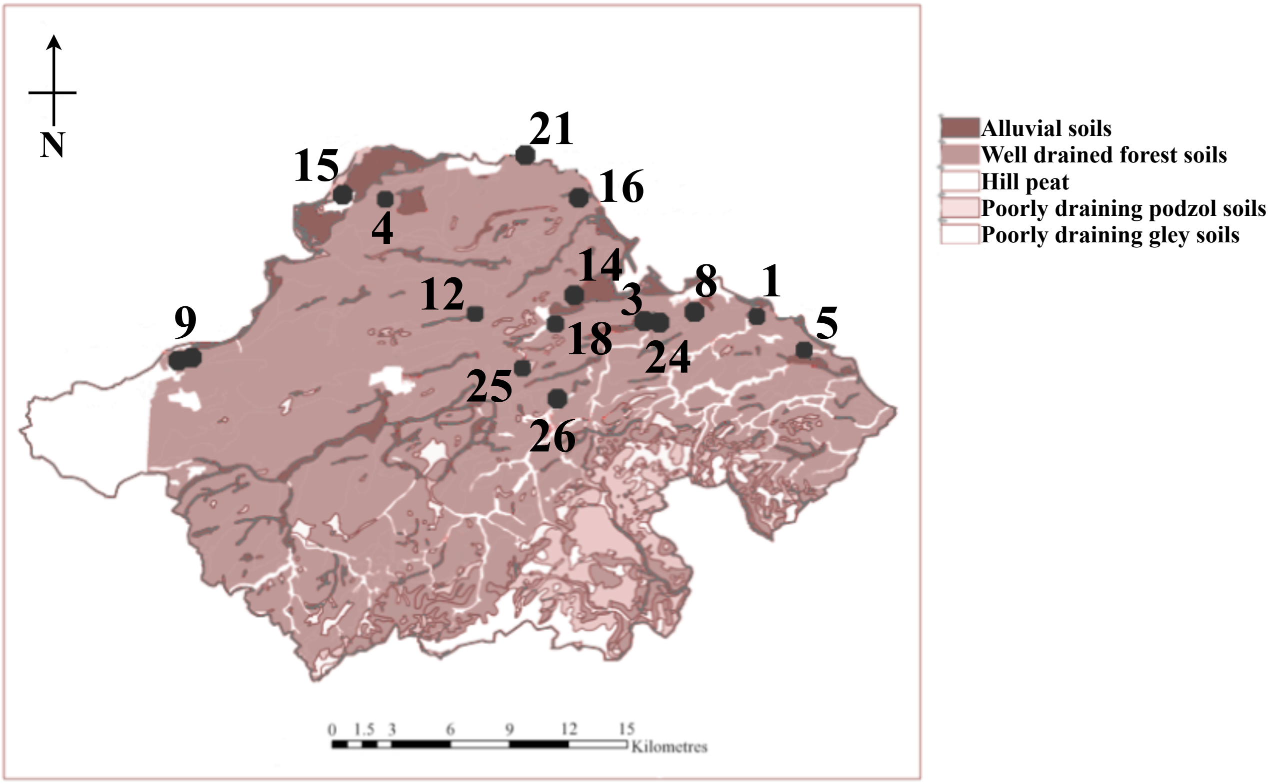



**Fig.26:** The excavated sites in East Lothian (see Figure 1) with worked stone in their assemblages. (Map: R Reader and M Maxwell)

The range of worked stone objects found at Broxmouth are typical of a British Iron Age site. The worked stone assemblages from East Lothian, including Traprain Law, are all similar in nature to those found at Broxmouth (Table 7). The assemblages include saddle and rotary querns, cupped blocks, cobbles used for smoothing, polishing, rubbing, pounding, grinding and sharpening, slabs used as mortars and working surfaces, perforated objects including weights/or whorls, stone balls, moulds, ground discs, and domes. Predominantly worked stone objects from the region are from local stone sources (Table 8). Similar use-wear patterns are found across the different site assemblages, showing that they were involved in similar processes and regional wide practices of appropriation and engagement.

The worked stone assemblage at Broxmouth is noteworthy for the large quantity of saddle and rotary querns recovered; 20 saddle (in 22 fragments) and 36 rotary (in 41 fragments) querns, five of which are complete quern stones; a lower rotary, a complete saddle and three unfinished rotary querns. Two of the unfinished rotary querns are refashioned saddle querns. From excavated Iron Age sites in East Lothian, there are 38 quern fragments recovered in total, over half of which are from Dryburn Bridge where at least 17 saddle querns were known to have come from one house (House 2, Dunwell 2007: 75). Only nine querns (eight rotary and one saddle) from Traprain Law are present in the National Museum of Scotland, but it is likely that far more were recovered during Curle and Cree's excavations but were not kept. Of the 38 fragments, 15 are from rotary querns including one upper and one lower from Knowes which conjoin and match in lithology and use-wear, therefore belonging to the same quern (SF 41 and SF 65).

### 5.1 From functional to cosmological

In the Mesolithic, Neolithic and Bronze Age stone objects often are considered symbolic items of status or ideology but in later periods tools are relegated to uses in hunting, agricultural, and domestic related processes. Hafting, chopping and cutting, working hides, hulling, pounding and grinding grain and sharpening bone (early and later prehistory) or metal (later prehistory) implements, were activities in which stone tools played a crucial part. Their role as grinders for pigment (Isbister 2000) and metal ore (Curle, 1932–3: 87; Williams, 1978: 47) in the Late Bronze Age and Iron Age has also been noted. While studies carried out on Neolithic stone objects place prime importance on object biographies and their ideological power as integral to society and identity (e.g. Torrence 1986, Bradley and Edmonds 1993, Thomas and Tilley 1993), for the Iron Age there is little work to date which attempts to get beyond purely functional categories to fully contextualise stone 'tools' within their spheres of engagement. This is due to a few reasons; stones in this later prehistoric period were predominantly locally appropriated, not enchained in long distance networks of engagement, and were involved in 'mundane' everyday domestic and agricultural tasks. Whereas, in the earlier Stone Age a lack of metal meant presumably that stone had a higher value, which in turn was worked with skill, involved in non-local exchange networks and special deposition, for instance away from settlement sites (Edmonds 1995: 177), in funerary and watery contexts (Bradley and Edmonds 1993: 204).

However, these assumptions of what makes stone valuable or not has been criticised by Taçon (1994) and Gero (1991) who argue for the essential social agency of stone tools, even experienced as works of art (Taçon 1994: 118-119). It is not necessary for stone tools to be quarried from special sources, involved in long networks of exchange and exempt from everyday engagements for them to be active in defining identities and meaning in the world. Privy access to imported jet from Whitby, Yorkshire, and imitation jet-like materials and their association to inhumation burials is argued to have maintained exclusive high status membership to a 'Jet Set' in Wales during the late Neolithic and Bronze Age (Sheridan and Davis 1998). However, other studies have questioned the link between exotics and inalienable value, to argue that engagement with local materials were integral in maintaining ties to ancestral landscapes; that the stones in non-portable megalithic monuments were omnipresent personalities (Gillings and Pollard 1999: 179-193, MacGregor 2002: 141-158, Thomas and Tilley 1993: 235). Indeed Tilley has written on his phenomenological experience with the materiality of stone, attempting to elucidate its haptic, colourful and presencing qualities as part of the changing human landscape (Tilley 2004). The focus should not just be on the episode of acquirement, since value is negotiated and re-negotiated through human-material relationships within non-static contexts (Appadurai 1986). Indeed, many jet beads are found on necklaces abutting skueomorphic beads of jet, for example blackened bone, evidence of their elaborate network of engagements, not restricted to a single individual and episode of acquirement (Clarke et al 1985: 289, Jones 2004: 171, Woodward 2002). Attention to how objects were engaged with throughout their biographies is necessary (Gosden and Marshall 1999, Henare et al 2007, Hodder 1986 :1-10). The shiny black colour and electrostatic properties of jet (when rubbed it sparks) have also thought to have had magical or healing properties, part of its value (Allason-Jones 1996, Sheridan and Davis 1998: 148, Shepherd, 1985: 204), thus we should consider whether objects of jet show evidence of rubbing or grinding exploiting its electrostatic properties. Nevertheless it is clear that despite some publications (e.g. Allason-Jones 1996, Boivin 2004, Giles 2007, Jones 2004, Taçon 1991, Tilley 2004) and "aside from passing remarks and occasional tantalising studies...surprisingly little regard has been paid to non-functional aspects of the mineral world in either the archaeological or anthropological literature" (Boivin 2004: 2). The focus remains on end products despite calls to consider the signative qualities of material substances enacted through making, using and depositing (Boivin 2004: 2-4, Ingold 2007, Renfrew 2004).

This is true in Iron Age material culture studies where the finished products of querns have been a main focus. The lithology and typological development of querns have been studied for their practical economic implications and for what they may say about political external relations of communities. Curwen's genealogy outlined the chronological development from saddle querns to a preference for rotary querns (Figure 27; Curwen 1937). Curwen's observed patterns were heavily based on material from southern England. The introduction of rotary querns (500/ 400 BC), are frequently

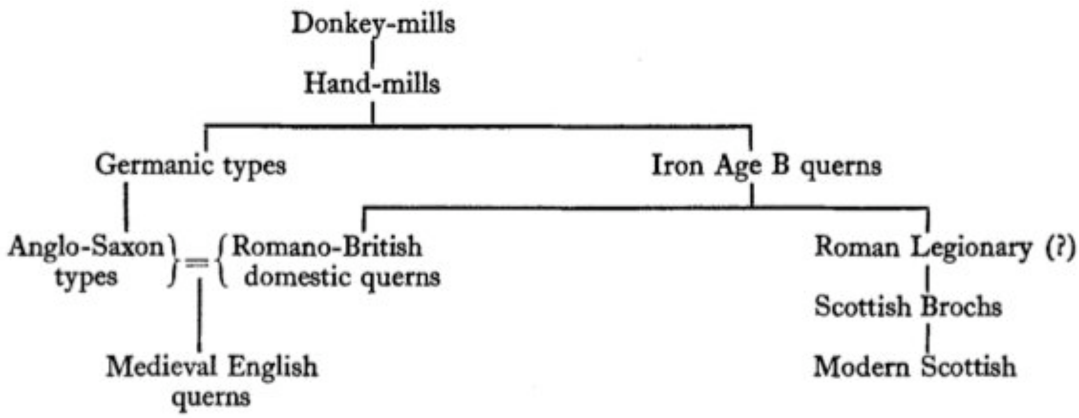



**Fig.27**: Curwen's genealogy of quern developments (Curwen 1937: 151). A derivative, evolutionary understanding of form and design.

considered pivotal agents in a changing economy and social system (MacKie 2007 and 2010), against the background of increasing agricultural intensification and the production of surplus. Additionally, lithological studies have shown that for many sites in central and southern Britain stones for querns were mined from particular sources, and so were one of the few stone artefact types in the middle to late Iron Age involved in wide networks of engagement. For example many querns found on Iron Age and Roman sites in Wessex including Danebury, Hampshire and as far north as Desborough, Northamptonshire are made of a particular stone which originated from a quarry in Lodsworth, West Sussex (Heslop 1988: 62, 67-69). In the Late Bronze Age production of saddle querns made of Lodsworth stone was considered to be carried out by non-specialists and only the raw material taken away from the quarry site "fashioned to the desired shape at home" (ibid: 76), therefore a communal model of production was envisioned. From the middle Iron Age into the Roman period rotary querns made of Lodsworth stone were apparently worked by a limited few specialists at the quarry site due to their standardised design and how they were hafted in a particular way, suggesting that "production was now in the hands of specialists who controlled the rock bed" (ibid:76), making Lodsworth an important political Iron Age centre of trade and exchange (ibid.: 77). This supports a general pattern of development from the communal, egalitarian models of consumption to politicised models of exchange controlled by a few individuals in the later Iron Age.

This model of quern development has prevailed (MacKie 2008 and 2010). However, at Broxmouth a saddle quern (DNC) and almost complete rotary quern (DNA) is found in the same episode of paving in House 7 (HBV), suggesting contemporary re-use. Recent studies have moved beyond a de-humanised typological and machinistic account to recognise their cosmological significance in the everyday. Indeed recognition of the long term biographies of both saddle and rotary quernstones with greater attention to archaeological context, where querns are often found as part of structured abandonment deposits or re-used in walls and paving, complicate neat evolutionary and chronological models of quern development. McLaren and Hunter's (2008) recent detailed study of the manufactured form and decoration of querns from Scotland shows that the picture of quern development is more complex than previously understood. This marks a shift in emphasis for quern study; from regarding their role simply as functional objects in basic models of evolutionary, economic and political change, to an interest in local and regional practices of quern manufacture, decoration, fragmentation and deposition (ibid: 105, 122 &125, Heslop 2008, Heslop et al 2009: 128-129, Hunter 2009: 140, Innes 2008: 119-145, Lelong 2008:147-197, Lelong 2008: 264). Indeed, querns which turned grain into flour, may have embodied and fueled ideas of transformation, productivity and fertility, important to agricultural communities (Fendin 2000, Hingley 1992: 11, 38-39 and 41, McLaren and Hunter 2008: 119). The deliberate fragmentation of quern and grinding stones may be a deliberate re-enactment of the pounding and grinding of the hulled grain (or seeds or other materials), linked to beliefs of controlled transformation and decay (Fendin 2000: 92). Deliberately fragmenting querns may also be part of feasting events. At Knowes a smashed Roman flagon (SF 164, 166, 173, 204 and 247) and a probably deliberately fragmented rotary quern upper (SF 41) (an incised groove on its grinding face coincides with a fracture line) were found in the same structure (CS2) (Haselgrove et al 2009: 89-90, Heslop et al 2009: 127 and 129, Hunter 2009: 140). The matching lower rotary quern stone (SF 65) to this fragmented upper (SF 41), has traces of burning on its grinding face which is absent on the upper (SF 41). It is perhaps no coincidence that the non-burnt lower rotary quern stone (SF 65) was then found within the hearth infill of structure CS2, in which were also charcoal and charred cereal remains (Haselgrove et al 2009: 89-90). The burnt lower of the pair (SF 65) was found elsewhere on the surface of the eastern ditch, associated with a clean context layer in which there was no rubble or midden material and therefore laid down as a possible closing deposit (Haselgrove et al 2009: 73). At Broxmouth acts of burning, fragmentation and structured deposition of querns are evident too; the most striking example is a pair of refitting lower rotary quern fragments (BZQ) on which burning is evident on the grinding face clearly on one half (McLaren in prep. 2013). Both of these fragments were then re-united in deposition, included as part of a single infill event of a pit (DDX) in House 2 in which were also fragments of bone and charcoal.

In East Lothian post AD 200, quernstone fragments have been re-used as part of cist walling in cemeteries at Parkburn and Camptoun (Henshall 1955-56, Hingley 1992: 38-39), perhaps a testimony to their long standing roles in understanding and performing cycles of life and death (Hingley 1992: 39). At Cnip, a wheelhouse complex in Lewis, all the querns were recovered from structural contexts, as at many other Iron Age sites, leading to the suggestion that rather than being simply useful building stones ‘it may have been a deliberate act invested with a deeper meaning relating to the community or landscape, perhaps similar to the inclusion of stone arable tools and grain in the walls of earlier prehistoric houses in Shetland' (Clarke 2006a: 151). However, Armit's discussion questions this intent taking a 'skeptical functionalist viewpoint' (Armit 2006: 249) arguing that the inclusion of querns in structural building works at Cnip was opportunistic. There is no explicit contextual evidence or special treatment of the quern fragments themselves to suggest a ritual or cosmological practice at this site: 'since almost any part of a wheelhouse with the possible exception of the piers and central area could be considered as liminal to some extent' and the quern fragments can be found in a variety of structural episodes and positions and no serviceable querns had evidence of being deliberately 'sacrificed' (ibid.: 249).

However, despite the above discussion of potential signative roles, the materiality and biographies of querns in Iron Age Britain has not yet seen detailed study. Furthermore, other stone tools involved in agricultural activities have been largely neglected, relegated to descriptive site catalogues. An exception is Clarke's work which integrated the disparate contextual, manufacture, use and depositional data of Iron Age coarse-stone artefacts for the Northern Isles, and arguing for their integral role in aspects of social continuity and change (2006: 1). Clarke's analysis importantly determined stone tool function in processing and agricultural activities, proving their involvement in hide and cereal processing through use-wear (ibid.). However, little attempt was made to consider any possible symbolic roles due to the over-proportionate archaeological visibility of coarse-stone tools, which it is argued, would risk giving them 'an important and central role in interpretation which they do not merit' (ibid.:128). The following analysis presented in this chapter will show that such a position is untenable for the Iron Age worked stone of south-eastern Scotland.

### 5.2 The East Lothian worked stone assemblages

All of the worked stone assemblages examined will be discussed together following a biographical structure. In this way the relationships between appropriated materials and people during social contexts of appropriation, use and deposition will be addressed, elucidating the social and cosmological roles of stone objects in addition to their pragmatism.

All of the worked stone from Broxmouth (289 objects), and a large proportion of the worked stone assemblages from other sites in East Lothian, given in Appendices 1 and 2, were examined first hand, including the unpublished assemblage from Newmains which has 10 worked stone objects. The original catalogue descriptions provided by Curle and Cree (unpublished NMS Traprain Law catalogue) are not always correct, and so without having analysed all of the c.670 objects, I cannot be certain of how representative my sample is, but of the c.670 objects from the Curle and Cree excavations at Traprain Law (Curle 1914, 1915, 1920 and 1922; Cree 1923 and 1924, unpublished NMS Traprain Law catalogue) 313 have been examined. This is a selection of what was accessible from the Traprain Law assemblage in the store at the National Museum of Scotland in Leith, Edinburgh during October 2010 and February 2011, attempting to cover the range of stones and their forms, working in the first place from the published reports and unpublished NMS catalogue and which on a brief prior visual inspection at the store showed signs of use or manufacture. This included a representative proportion of the cobbles, discs, perforated discs (probable whorls) and querns found at Traprain Law. Therefore the quantities of objects given in Tables 8 to 12 for Traprain Law are believed to be representative, but should be considered with this in mind. Due to problems in access and time restraints, objects not examined first hand from the other assemblages include 12 from Knowes, one from Standingstone, three from Whittinghame and all from the Traprain Laws Environs Programme of excavation (two objects from Biel water, one from South Belton, one from Thistly Cross, five from Eweford Cottages and 15 from Phantassie). However, the catalogues from these sites are recently published with very good object use-wear descriptions and illustrations (Heslop et al 2009: 123-136 , Innes 2008: 119-146, Lelong 2008: 147-198) and therefore these objects are included in the analysis presented here.

The sites St Germains and Dryburn Bridge are problematic. No objects from St Germains were examined first hand. Of the 30 worked stone objects recovered from St Germains during the original 1978-81 excavations, 13 were stolen from the site hut and record of them only survives in photographs and drawings (Alexander and Watkins 1998: 208). The other 17 objects were examined by Gleeson (1998: 240-242) and their basic use-wear and dimensions catalogued and this information has been used in this chapter. From Dryburn Bridge the later prehistoric pottery, except for a beaker vessel, and many of the coarse stone objects are now missing and could not be located by Dunwell (Dunwell 2007: 4) or me either. From Dryburn Bridge the only objects which could be included in this chapter were those objects present in the National Museum of Scotland store and examined first hand by the author. Furthermore, due to the nature of this being a backlog project, there are problems linking the 2007 publication to the archive which lacks a concordance of small finds numbers and respective context codes (Dunwell 2007: 4). This meant that the finds codes given in the 2007 publication could not be linked to the finds present in the museum as the finds bags have a different system of numbering on them. Unfortunately I have been unable to link what I examined in the museum to objects discussed in the 2007 publication. The finds reports created c.1980 are included in the 2007 publication (Cool 2007: 75-78), however these catalogues are incomplete and only refer to illustrated objects. Nevertheless information from Cool's reports are included in the analysis here where possible. It is regrettable that the material culture record from Dryburn Bridge is partial, and that most of the objects are unable to be provenanced to context.

Lithologies of the worked stone are taken from published sources (Heslop et al 2009: 123-136), the original Broxmouth archive and from first hand examination; all objects from Archerfield, Craigs Quarry, Dryburn Bridge, Ghegan Rock, North Berwick Law and Traprain Law were not previously identitified to lithology. Scottish Natural Heritage, the Lothian and Borders RIGS group affiliated with the Edinburgh Geological Society and the Gazetteer of Scotland (Groome 1882), were consulted in order to geographically locate the sources of appropriated stone in Iron Age East Lothian. Canmore (the Royal Commission of Historical and Ancient Monuments online database) and the British Geological Survey provides useful information on modern exploitation of local geology.

**5.3 Appropriation**

All of the worked stone from Broxmouth and the other assemblages were of locally available sandstones, mudstones, siltstones, volcanic and igneous erratics, quartzite and shale, excepting four objects (Table 8). The soil in lowland East Lothian is generally stony, with angular and sub-angular pebbles of fine-grained sandstones, siltstones, claystones and occasional quartzites in varying small to large sizes. Sandstone clearly

**Fig.28:** Pinky red old red sandstone harbour wall at Dunbar.
(photograph: M Maxwell)

dominates the worked stone assemblages, then shale followed by quartzites (Table 8). The bedrock geology is predominantly of old red sandstone in hues of red and pink (Figure 28). Fossils are not frequently found in old red sandstone (Barclay 2005:17), however there are two old red sandstone boulders with fossilised plant inclusions used for upper rotary quern fragments (DDO, DVR and FBI) from Broxmouth. Worked old red sandstone (ORS) with ferritic inclusions are found at Traprain Law (utilised cobbles

**Fig.29:** Pinky red old red sandstone boulders, dolerite and black rough basalt boulders on the beach at White Sands, adjacent to Broxmouth (see Figure 2).
(photograph: M Maxwell)

1922.306 and 1922.264) and Broxmouth (upper/lower rotary quern EBZ and upper rotary quern FNC). Old red sandstone form the Lammermuirs in the south, extending northwards through East Lothian (ibid.). The old red sandstone sequence (laid down in the Devonian epoch) also includes greywackes, conglomerates, mudstones, siltstones and thin limestones (Groome 1882: 235, Browne et al 1995). These stones need not have been extensively quarried but can be found across East Lothian as outcrops or washed up as cobbles on river-banks or up the coast (Figure 29), and many cobble tools in the East Lothian worked stone assemblages are waterworn.

There are also at least two intriguing re-used Neolithic axe-heads from Traprain Law with use-wear characteristically similar to the Iron Age cobble tools examined; both show rounding of edges subsequent to breakage, pounding and polishing at their ends (GV 1331, GV 1332) (Figure 30). One of these axe-head fragments is made of an unusual igneous black rock with ferritic inclusions (GV 1331). The other is made of greywacke sandstone. It is possible that they were found and appropriated for use, either as knowingly or unknowingly ancient objects. At least 19 Neolithic stone axe-heads, 14 of which are broken, have been


**Fig.30:** *Left* Two broken Neolithic axe-heads (GV 1331, GV 1332) from Traprain Law with post-breakage use-wear. The use-wear is the same in character as the Iron Age cobble tools examined, including this one from Broxmouth on the *right* (EHP, Phase 2). It is argued that they may have been re-used in the Late Bronze Age or Late Iron Age. (photographs: M Maxwell)

found to date on Traprain Law (unpublished NMS catalogues). Unfortunately the context data for these objects is lacking and so they cannot be associated to the Late Bronze Age or Iron Age period with certain. However, Neolithic axe-heads turning up in Iron Age contexts is documented elsewhere, for example a broken stone axe was found in a rubble rampart context at Hownam Rings (Piggott 1948: 214-216), suggesting re-use in the Late Bronze Age or Iron Age.

Dolerite was exploited by Iron Age people in south east Scotland (Figure 29) and is found as an intrusive deposit in sheets of  sandstone and limestone in the region. However, interestingly no limestone is known from the East Lothian Iron Age artefact assemblages, despite it being an abundant resource (Groome 1882: 237) and also the geology on which Broxmouth was situated. Indeed exposed bands of limestone occur at

**Fig.31:** Band of white limestone lying over the pinky sandstone geology on the coast of East Lothian at White Sands, adjacent to Broxmouth. (photograph: M Maxwell)

the base of Ghegan Rock and at Rhodes Quarry, both East Lothian, where apparently it "gives off a fetid odour" (Groome 1882: 236). Unpleasant smell may have been a reason for its avoidance.

*Local coast-scapes*

Riverbanks and the nearby coast were the most accessible stone resources. Many of the utilised cobbles are waterworn particularly from Broxmouth (Figure 32) and Traprain Law, and also at Dryburn Bridge (DB 78) and Knowes (SF 228). Underlying geological strata of calciferous sandstones and shales cuts across East Lothian from the coast at Belhaven Bay to Traprain Law (Groome 1882: 236) and can be seen eroding out from the coast 3.4 km further south by East Links Golf Course and South Sands (Figure 33). Shales were used to make bangles and other perforated objects which can be found at just over one third of sites in East Lothian, while actual evidence for manufacture is found at only four sites (Broxmouth, Dryburn Bridge, Newmains, Phantassie). Shale working took place in Phases 3 and 5 at Broxmouth, but it is unclear whether this

**Fig.32:** Waterworn cobble tool (FYY) used as a smoother/polisher from Broxmouth, Phase 2. (photograph: M Maxwell)

**Fig.33:** Looking north at White Sands, adjacent to Broxmouth. An exposed shale seam. (photograph: M Maxwell)

chronological pattern is repeated at other site elsewhere in East Lothian since shale working debris are unfortunately from badly dated contexts. Limpet scarring is seen on seven of the querns from Broxmouth, all of which are rotary querns (three upper, two lowers, two unfinished) (DDP, DVR and FBI, EIT, EKB, ELU, FGA, FWY) and on three rotary uppers from Phantassie (SF 72, SF 563, SF 508), one rotary upper from Traprain Law (illus 5c in Hunter and McLaren 2008: 117-118), one rotary upper from Knowes (Haselgrove et al 2009: 71 fig.5.5) and on one utilised cobble from Whittinghame (SF16).

**Fig.34:** *Left*, the limpets at home on the sandstone geology along the East Lothian coastline at White Sands. *Right*, limpet scarred ORS boulder on the beach at White Sands. (photographs: M Maxwell)

The limpet scars on one of the rotary uppers (EIT) (Figure 35) and possibly on the unfinished quern (FWY) from Broxmouth made of particularly coarse grained old red sandstone, on two of the rotary uppers from Phantassie (SF 563 and SF 72) and the rotary upper from Knowes (SF 104), look to have been deliberately enhanced by pecking. Additionally, the worked slab placed over grave J in the Cemetery at Broxmouth has in addition to natural limpet scars an added curve of artificial limpet scarred across its width (the grave was radiocarbon dated to 380-200 cal BC SUERC-24256). This slab was placed with the arc of limpet scarring facing upwards so that it would have been visible to those visiting the grave (Figure 50). The saddle quern from Broxmouth (FWY) was partially modified later in its biography and at this point areas of the limpet scarring removed (Figure 42). Upper rotary quern fragment SF 563 from Phantassie was placed in a corner of a building with its decoration of pecked hollows and radial designs showing (Lelong 2008:162 and 164, fig. 7.16). The rotary upper quern fragment from Knowes (SF 104) was deliberately placed with its limpet scarred and pecked hollows showing and grinding face down (Haselgrove et al 2009: 71 fig.5.5). At Dryburn Bridge a limpet scarred slab was used in paving in a house (Figure 36).

**Fig.35:** Upper rotary quern fragment (EIT), broken across perforation, found sealing a pit in House 6, Phase 6 at Broxmouth. The concentric limpet scars are an attractive decorative feature, and some have even been enhanced by pecking (indicated by arrows). *Not to scale.* (photographs: M Maxwell)

**Fig.36:** Limpet scarred slab in House 2 paving sealed by abandonment deposits at Dryburn Bridge. (photograph: Dunwell 2007: 58, illus. 45).

River and sandy coast-scapes were never far from Iron Age settlements in the region and the sea always a visual presence. Today the county of East Lothian has 51 km of coastline, 26 km along the North Sea have "irregular and bold cliffs" (Groome 1882: 234). Limpet scarred boulders of sandstone pepper these shores (Figures 32 and 34). Coasts and river banks can be both tranquil and dramatic places, dynamic and unpredictable. Haddington has a history of devastating floods and in 1358 a flood is documented to have almost swept away the town's convent, whilst there is also a plaque in the town dated to the 4th of October 1775 commemorating when the river Tyne rose 5m in one hour (Groome 1882: 231). The enhanced limpet scarred querns from Broxmouth and the pecked upper rotary querns from Phantassie perhaps embody such drama. Pecking into the coarse rough lithology of dolerite or old red sandstone blocks with many medium to large inclusions (often fossil, quartz or ironstone) chosen to make these querns, would not have been easy and will have been quite a performance. The repetitive percussive *clinking* noise with a deep hollow resonance from the flint or metal

**Fig.37**: The abundance of natural cobbles along the East Lothian coast at White Sands, adjacent to Broxmouth. Pinks, reds, purples, blues, greys, whites and a variety of fine-grained to medium-grained are available. Nodules of hematite can also be found. Many are limpet hollowed and there is one boulder with many white fossil inclusions. (photograph: M Maxwell)

chisel hitting the stone perhaps referenced the thunders and claps of waves. This noise was a noticeable background rhythm to activity. For the maker when the chisel carved through the sandstone it felt as though it turned to sand through their steady grip. The gritty debris was texturally reminiscent of sand from the shore which dispersed into the air shrouding the maker in a pink/red mist perhaps reminding people of haar (a sea mist common to the low lying south-eastern coastal coast-scapes). These performative elements of the dressing and manufacture of querns and cupped stones were perhaps regarded as important for bringing stone to life and enacting the relationships between stone and place.

*Ancient volcanic landscapes*

Volcanic rock outcrops, igneous rocks, basalt and felstone have a defined local distribution in south east Scotland not extending beyond modern day East Lothian (Groome 1882: 236). Basalt boulders can be found lying on the East Lothian coast from molten magma dyke intrusions by North Berwick, the East Links Golf Course and South Sands (Figure 29). The Garleton Hills are formed of volcanic basaltic tuff and breccia, overlaid by poryphyrite lavas (ibid.) (Browne et al 1995). Traprain Law, North Berwick Law and Bass Rock are ancient volcanic plugs of molten magma basaltic laccolith intrusions (where the magma sideways intrusion is particularly thick so gathers in a mushroom shape forcing the softer sedimentary strata upwards) (Scottish Natural Heritage accessed 07/05/2012). Local volcanic rock outcrops and boulders were exploited for some objects, predominantly querns and rubbing stones. Hematite, which is found as ground nodules in the worked stone assemblage at Traprain Law, was until recently extracted at Skid Hill Quarry in the Garleton Hills (Canmore site number

NT57NW9, Groome 1882: 237) and can be found washed up as nodules on the local East Lothian coastline.

*Non-local stone sources*

The only definite examples of non-local stone suggesting extended networks of engagement are two non refitting saddle quern fragments both from Broxmouth (EKC, Phase 6 and FVB, Phase 1) made of markle type basalt which is specific to central and south-west Scotland (Browne et al 1995, Francis et al 1970) and two small polished discs made of serpentine, not common in Britain (Bucher 2005: 408). Serpentine is still worked today to make local souvenirs at Lizard Peninsula, Cornwall. The polished discs show no use-wear and are a type of object common to Traprain Law (e.g. GV 169); there is also an example found at Ghegan Rock (HD-99), but none in the other assemblages examined. Additionally, jet was possibly used for making beads at Traprain Law (GV 435) and Knowes (DB 79 7657/55), but it is notoriously difficult to distinguish between shale, jet and other forms of lignite so unless these objects are scientifically analysed we cannot be sure of their origin (Sheridan et al 2002); they are both listed under shale in Tables 7 and 8. Jet has a very restricted occurrence in Britain, the most likely source was from the area of modern day Whitby, in North Yorkshire (ibid.), and possibly from the Kimmeridge shale beds in Dorset (Davies 1936).

## 5.4 Perceived affordances

### 5.4.1 Colour, smell and texture

*Colour*

The colour of the local sandstone from East Lothian is made up of a variety of buff, yellow, orange, pink, red beiges and greys, all with a micacious glint. Old red sandstones with a pinkish red tint dominate the worked stone assemblages examined. These colours and hues will have been brighter when freshly chipped, pecked or incised into. All the variants of these colours are represented in the pecked stone balls (Figure 38). The colour of the inclusions in the sandstone range from black, orange, opaque to cream/white and mauve. The mudstones are generally darker reddish browns/black in colour, with a micacious glint. There are also occasional examples of greenish grey


**Fig.38:** A selection of stone balls from Broxmouth, showing the range of pinkish and reddish hues to bluish grey of the locally available sandstone from East Lothian. (photograph: M Maxwell)

sand/mudstones; two discs from from Traprain Law (GV 77 and GV 701) and two whorls, one from Broxmouth (EYP) and the other from Traprain Law (VII 2039). The basalt objects from Broxmouth are dark grey/black; saddle querns (EKC, FVB, FXO) and a flake from a cobble tool (GIM).

Darker igneous rocks are found at Traprain Law (GV 1331 with rusty red ferritic inclusions, GV 426 with rusty red ferritic inclusions, 1922.310 N3 with no inclusions, GV 495 with white quartz inclusions), at Ghegan Rock (HD 101- no inclusions) and Knowes (SF 224-no inclusions). These stones are dark gunmetal grey in colour to rich black, though the Ghegan Rock example has beige stripes running through it. This type of rock has an extremely smooth sheen if rubbed and all show signs of rubbing except for the cupped stone igneous boulder from Knowes.

Disc objects from Traprain Law are unusual bright green, blue and red colours. Indeed small polished discs are usually catalogued as palettes or gaming counters (Hunter 2009: 142; Gleeson 1998: 241); a colour vocabulary for these forms was perhaps appropriate for their use in processing pigments or necessary for team games and point scoring, though there may be another reason. Many of these unusually coloured discs were not examined in detail by this author (they lack use-wear), but original catalogues from the Curle and Cree excavations (stored in the National Museum of Scotland digital archive) give some of these discs unusual lithological descriptions including 'encrinitic limestone' or 'coprolites'(fossilised stones), some as 'mottled' in colour and one with 'vesicular cavities' which on examination is an igneous rock with ferritic inclusions (GV 426). Another small tear-shaped object made of serpentine (one of several, though the others are disc shaped) from Traprain Law is marbled black and blue in colour (GV

1619). The only other Iron Age site in south-east Scotland which has a serpentine object is Ghegan Rock; it is a small polished stone disc marbled green, black and beige (HD 99).

Quartzitic sandstone is found at Traprain Law, Broxmouth, Dryburn Bridge, Standingstone and Knowes. This type of stone glints and has a crust of sandstone in buff and brown tones with pinkish hues and has a cold grey or opaque luminous white/pink core.

Shale is uniformly dark grey to black in colour. Shale is naturally smooth and if polished can become extremely smooth with a high sheen. Polished shale feels the same as jet and the deliberately heated and blackened antler/ animal bone objects from Broxmouth (Chapter 4 and Box 1).

*Smell and substance*

Richly red coloured nodules of hematite and ironstone are found in the worked stone assemblages at Traprain Law. Many of these rich dark red hematite nodules have ground facets (GV 1285, GV 1286, GV


**Fig.39:** Two ironstone objects from Traprain Law. *Right*, a circular rubber/pounder (GV 246). *Left*, an elongated firecracked hone with brown encrustation on its surface (GV 343). (photographs: M Maxwell)

1178) suggesting they were either used as rubbers or ground down to create pigment. Similarly, the two ironstone objects rich red/chocolate brown with an orange interior, both from Traprain Law, have areas of rubbing covered in irregular stria in all directions suggesting use as a rubber or source of pigment (GV 246 and GV 343) (Figure 39). GV 343 has a yellowy brown encrustation on its surface and while both of these objects are fractured or chipped, GV 343 has for certain been fired at a very high temperature and is firecracked. A very similar object to GV 246 is found at Hownam Rings, Roxburghshire, with irregular stria and is firecracked (seen in National Museum of Scotland). It is also possible that both hematite and ironstone were exploited as a source for iron for smelting, although ironstone has a much lower iron content (Chapter 7). Possible attempts to extract larger iron inclusions from sandstone objects is seen on a cobble tool from Broxmouth (EEY), which has localised pecking around its ferrous inclusions, and a quern fragment (cannot identify if saddle or rotary) from Dryburn Bridge (DB 79 561) whose worn grinding face has been pecked after use, including localised pecking around one of three large ferrous inclusions. Despite this, the small size of these extracted iron deposits may suggest their use for pigment preparation, rather than for metalworking. A ferrous deposit on the surface and a pigment like substance is recorded in an area of the incision of a decorated stone slab with triangle motif from Whittinghame (SF 15) showing the potential use of ferrous substances for pigment (Heslop et al 2009: 128-129).

There is more evidence for pigment preparation. Remains of ferrous deposit on a sandstone block from Whittinghame (SF 14), suggests that this may have been used as a working surface for grinding pigment made from an iron rich substance, rather than its use in preparing ore due to a lack of metalworking evidence from this site (Heslop et al

2009: 129). A yellowy substance sits in the pecked cup on a sandstone mortar (CZI) and a yellowy green staining on a stone disc (GDX) both from Broxmouth and examined under microscope. Similarly, a disc from Traprain Law has a bright yellow residue on one of its ground faces (X.GV 1526). A bright blue residue associated with a colourless gloss is found on a 2 x 2mm area of a ground facet on a re-used whorl (GV 1287) from Traprain Law (Figure 40). Splodges of black residue are found on a cobble tool (DB78 548) and traces of a black glossy staining on the grinding face of a saddle quern (DB78 230) from Dryburn Bridge. Encrusted dark brown/ red residue is found all over on a miniature rubber (GV 1517) and on one worn face and edge of a whetstone (GV 343) from Traprain Law. Two sandstone discs from Traprain Law also have dark brown/ red residue on one of their grinding faces (GV 620 and GV 621) and additionally there is a re-used spindle whorl made of igneous stone (1922.310 N3) (mentioned above) with grinding facet in one area on its circumference, with traces of dark red/brown residue. On GV 621 the residue is clearly sitting on the surface and is blobby in texture. Glossy or waxy dark brown/red to black staining is found on cobble tools (smoothers, rubbers and sharpeners) at all sites. In total 59 cobble tools from the 241 examined first hand from Iron Age sites in East Lothian have this type of residue/staining associated with rubbing/ grinding or sharpening use-wear. This darker residue/staining could result from a wet abrasive pigment preparation method using water or a viscous clear liquid such as resin or gum (Isbister 2000) or from other activities such as grinding of other organic

**Fig.40**: A whorl re-used as a grinder (GV 1287) from Traprain Law. Around the area of the ground facet are splodges of blue associated with a glossy residue. Not to scale. (photographs: M Maxwell)

substances such as ore, or from wool, textile or hide working. Scientific analysis, such as X-Ray Fluorescence (XRF) or raman spectroscopy, would identify these residues but was outwith the scope of this study.

The grinding and mixing of pigments would have been a smelly activity. Possible extracting and binding agents include bees wax, gum, resin, milk, egg whites, fats and juices from cooking meat, stale urine and other viscous opaque substances, possibly even human or animal semen as Carr has demonstrated for the preparation of woad blue pigment (Carr 2005: 276) and Isbister on the mesolithic preparation of haematite pigments (Isbister 2000).

*Texture*

Textures of appropriated stones range from very coarse and abrasive to very smooth. The textures differ according to grain and types of use-wear. The smoothest stones are shale, hematite, ironstone and serpentine. These smoother stones are generally cooler to touch. Coarse to medium grained sandstones with medium to large gritty sub-rounded to angular inclusions (ferrous, quartz, feldspar or fossilised) or coarse basalt were used to make querns (saddle and rotary) or cupped blocks, and are abrasive and cool to touch. The efficient coarse grinding surfaces of querns or cupped stones were smoothed down through use, occasionally to the extant that surfaces are glassy. Cobble tools are naturally fine-grained sandstones/ siltstones or mudstones and have a smooth outer surface easily rounded by water action, many of the cobble tools in the worked stone assemblages are waterworn, and subsequent handling. When handled these cobbles feel particularly warm and comfortable. Their smooth forms and warm qualities may have been deliberately chosen as they were held in the hand for use. The cooler and larger querns and cupped blocks were not handled often but interacted with through other materials: cobbles, wooden, bone or metal handles and potentially textiles.

Some stone objects from Traprain Law, and one from Ghegan Rock, were deliberately polished to enhance their smoothness. For example an elongated cobble was planed and smoothed but has no evident use-wear (X.GV 1166), two objects made from serpentine were polished and have no subsequent use-wear (X.GV 1619 from Traprain Law and HD 99 from Ghegan Rock) and some whorls and dome objects made of shale were rubbed to make their surfaces smoother (X.GV 1445, X.GV 1444, X.GV 1120, X.GV 1059, X.GV 251), unrelated to their actual use. These latter dome objects are indexical to the antler dome pedicles discussed in the previous Chapter 4 (Box 1). All other naturally coarse objects were only smoothed through handling and use.

### 5.4.2 Signative

Stones and minerals have been used in medicines and as poisons since antiquity and they may have had these powers in the Iron Age. Additionally, they may have embodied cosmologies of fertility, productivity, purification and transformation.

The word hematite comes from the Greek for blood, ἅιμα, which also refers to ochre, or other oxides of iron. Hematite is frequently referred to as a pyrite in Greek and Roman literature, but this is any stone which would spark when struck (Hoover and Hoover 1950:112). Hematite was noted by Agricola in his historical and modern account of mining and metallurgical methods *De Re Metallica* (1556) to be used as a flux in metalworking, as was quartzite (Hoover and Hoover 1950: 380 and 390). Both quartz and hematite are extremely resistant to erosion and weathering (Howie 2005: 571, Taylor 2005: 97-107), but also have the ability to transform under heat. They were stones which were considered to transverse the ancient categories of rocks and metals since they could melt in the fire like metal ore (ibid.: 2). However, stones which easily melted lost their original properties including hardness and form, whereas metals do not and can return to a solid structure (Hoover and Hoover 1950: 2). Pliny wrote that golden pyrites found in Cyprus could be melted in various ways “some persons fusing them twice, or three times even, in honey, till all the liquid has evaporated; while others, again, calcine them upon hot coals, and, after treating them with honey, wash them...” (Plin.Nat.36.30).


**Fig.41:** Quartz grinder (FWB) from Broxmouth, unstratified. (photograph: M Maxwell)

Shale, too, burns like a candle and can do so for extended periods of time, giving off strong sulphurous and noxious fumes, oozing oil and turning the shale grey to black to eventually yellow or red (West, http://www.soton.ac.uk/~imw/kimfire.htm accessed 05/07/2011). There are documented naturally occurring shale fires on the coast at Kimmeridge, of which one is documented to have burned for two years between 1972-74 (Cole 1975). Jet, and to a less extent shale and cannel coal, is also electrostatic and sparks when rubbed (Allason-Jones 1996, Sheridan and Davis 1998: 148). It too smells when when rubbed or burnt “like that of sulphur” (Plin.Nat.36). When Pliny refers to Gagates, we are not sure if he refers to jet, cannel coals or even shales, but “the fumes of it, burnt, keep serpents at a distance, and dispel hysterical affections: they detect a tendency also to epilepsy, and act as a test of virginity. A decoction of this stone in wine is curative of tooth-ache; and, in combination with wax, it is good for scrofula. The magicians, it is said, make use of gagates in the practice of what they call axinomancy (a practice using red heat)" (Plin.Nat.36.34). The associations of these stones with fire, light, heat and smell excreted their dangerous transformative powers. Metal tools were used to manufacture shale (Figure 45); both materials can spark, and their use together may have enacted these properties.

Quartzite may also have been chosen for its luminosity and iridescence. The handheld rotary quartzite grinders found in Iron Age East Lothian have a sandstone outer layer and a milky to pinky opal core which glints in the light, revealed from their use as grinders, rubbers and smoothers (Figure 41). In particular quartzite is believed by the Aborigines from Arnham Land to be the petrified bones of ancestors. The anatomy of quartzite is glowingly described by the anthropologist Jones (1990: 27, quoted in Taçon 1991: 203-204):

> The outer hydrated layer was referred to as the 'cooked skin'. Inside this was a think crystalline layer called militj, a word meaning 'white'. but especially in the context of a respected 'elder' and having reference to white hair. Finally within the best stones was a fine siliceous quartzite having a translucent pinkish-grey colour. This rock was called larr djukurr, literally 'fat flaking stone'. The term djukurr has many meanings. At the most secular level it means 'fat', especially the highly valued fat within and around the kidneys. . . .
>
> The cross-section of a flaked core was seen as being similar to that of a kidney, the inorganic mimicking

> the organic. Yet within the ritual realm, the inorganic was seen as being the quintessence of the organic, Lontaining its true being. In this sense, djukurr was seen as 'power', and it was this intrinsic power within the ngambi spear blades that caused such a searing burning pain; it was this which made the blood flow freely and which sapped away the life of any animal or man hit bv one. . . .

Hematite also has strong associations with bodily substances. In Roman medicine it was associated with the womb, childbirth and female 'diseases' including menstruation. Amulets made of blood-red hematite were incised with iconography of the uterus, including the depictions of the fallopian tubes and ligaments (Cruse 2004: 55). According to Pliny "it is marvellously useful as an application for bloodshot eyes, and, taken internally, it acts as a check upon female discharges. To patients vomiting blood, it is administered in combination with pomegranate-juice. It is very efficacious also for affections of the bladder; and it is taken with wine for the cure of wounds inflicted by serpents" (Plin.Nat.36.37-38), as a good cure for burns (Plin.Nat.36.38) and is used for the cure of diseases of the testes and "mamillæ" (breasts) (Plin.Nat.36.32). In Medieval medicine hematite was used with "dragon's blood" to cure women's "diseases" and "humors" constrict the vagina and calm excessive menstrual blood-flow (Green 2002: 70, 123). Hematite and quartzite nodules found on Iron Age sites are all handheld size and are smoothed or rubbed. Rubbing, grinding and handling enacted their transformative, curative power in antiquity and perhaps also previously in the Iron Age. A cylindrical piece of ironstone, perhaps an amulet, was found in an Iron Age cist at Pencraig Hill, East Lothian amongst two hammer stone fragments and burnt and unburnt human bone fragments from a person (sex not determined) who died between cal 170 BC and cal AD 30 (Innes 2008: 124).

Grinding the hematite at Traprain Law will have created a red powdery ochre which could be mixed with a binder to make a pigment, reminiscent of blood. Pliny describes it as “a stone of a blood-red colour, and which, when bruised, yields a tint like that of blood” (Plin.Nat.36.32). This is also the case for samian, which we have evidence of having been ground down (Chapter 6, Section 6.4.4). Since both hematite and blood have a high iron content they smell similar, especially when heated or rubbed. For modern Aboriginal communities in Western Arnham Land, Australia, red and yellow ochre pigments embody the creative and life-giving power held by the earth, who is believed to be female (Taçon 1993: 204). These pigments are linked to other substances which exhibit brightness and are also thought to be spiritually charged, including fat (possibly used as a binder for pigments and as a lighting fuel), blood (again, possibly used as a pigment binder), ironstone (used to make pigment) and quartzite (ibid.: 199).

Coarse-Grained sandstones, most often old red sandstone in hues of pinks and reds, were used to make the querns and mortars. The type of stone used for mortars and grinding stones is noted by Pliny to have been significant, particularly for those used to grind pigment and mix medicines (Plin.Nat.36.43). Their coarseness meant manufacture was a violent act. Querns and mortars conceptualised ideas of fertility, productivity and time in their use to grind the everyday staple grain (Fendin 2000) and may have been used to grind ore, pigments, pottery temper and other materials. They were thus embedded within the agricultural cycle and the rhythm of everyday life. Furthermore, in fragmentation they came to a violent end and new beginning (discussed below, Section 5.5.2).

Although we must be cautious in inferring the signitive powers of these materials based on Classical and Medieval texts and ethnography, as will now be examined below the curation, re-use and exceptional deposition of objects of stone is evident in the Iron Age of East Lothian, suggesting that they held a value in the everyday, perhaps conceived as bodily substances. The fragmentation and deposition of querns and worked stones (Section 5.5.2 and 5.5.4) are found in the same or similar contexts to the disarticulated fragments of human bone found on sites in the East Lothian Iron Age (Chapter 4) and more generally in Iron Age Britain (Armit 2012: 1-12, Tucker 2010). Querns may literally have been human flesh and bone, explaining their similar treatment. Aborigines of West Arnham Land believe that certain stones are the petrified bones of their Ancestral Beings (Taçon 1993: 195,197), bones of the dead were on occasion placed in hollows among these bones of their Ancestral Beings in order to turn to stone themselves (ibid.: 201).

Furthermore, the enigmatic stone balls were not smoothed and show no use-wear. All were made from medium grained sandstone and are naturally warm and smooth or abrasive to touch. At other sites stone balls like these have been interpreted as gaming pieces (e.g. Innes 2008: 128) and as sling shots (e.g. Cunliffe 1984: 425). Since they have no obvious practical use, they could instead be objects that are made to embody these powerful, curable and mutable materialities of stone.

### 5.4.3 Pragmatic

As discussed above (Sections 5.2 and 5.3) the majority of stone for working was locally appropriated and their natural colours and textures appropriated. We can only be certain that two saddle quernstones from Broxmouth were involved in extended networks of appropriation and the two serpentine objects from Traprain Law and Ghegan Rock. People were knowledgeable of the properties of different local stones and were choosy since limestone was avoided and volcanic rocks much less commonly used. Saddle and rotary querns, cupped stones and stone working surfaces make use of medium to coarse-grained sandstone or volcanic blocks with gritty ironstone, quartz, feldspar or fossil inclusions. Naturally circular and rounded slabs were used for rotary querns and slabs, and oval blocks for saddle querns and cupped stones. There is only one example of a quern, an upper rotary in two fragments from Broxmouth (DVR and FBI), made of a fine-grained sandstone but it has frequent large plant fossil inclusions making it a suitable choice for efficient grinding. Large angular inclusions and coarse fabric would not only make the task easier for grinding, pounding or pulverising tough seeds, grains, grit-stone temper or ore, it would also prolong the quern or mortar's use-life. As mentioned above, naturally fine-grained sandstone/ siltstone or mudstone cobbles with smooth outer surfaces seem to be deliberately chosen for objects held in the hand. The larger and coarser grained querns and cupped blocks would not have been handled often but were interacted with through other materials (smooth cobbles, wooden, bone or metal handles and potentially textiles). The natural smoothness and fine-grained nature of cobbles, and waterworn cobbles made even smoother from the action of the sea/ river, were exploited in their as handheld smoothers and rubbers for textiles, hides, burnishing pottery or other fine-textured substances.

Some stones may have been chosen for their natural decorative qualities; for example the fossil inclusions on some objects and the natural limpet scarring on many of the rotary and saddle querns and cupped stones. Stones with plant fossil inclusions from

Broxmouth include two upper rotary querns (DDO, DVR and FBI), the latter in two fragments, and the cupped sandstone with possible pigment (CZI). A rubber/ polisher cobble tool from Whittinghame has attractive fossil inclusions (TWT 16) (not catalogued in Heslop et al 2009). Although not examined first hand, the catalogue of objects found during Curle and Cree's excavations include four made of coprolites (fossilised faeces) and an 'encrinitic' disc (fossils of crinoids, marine animals). Limpet scarred querns include an upper rotary quern (EIT, Figure 35), a lower rotary (ELU) and an unfinished rotary quern abandoned during manufacture, all from Broxmouth (FWY). The limpet hollows on the old red sandstone block (FWY), possibly used as a paving stone or rubber at some point, had been enhanced by pecking, but later the circumference was re-dressed to make it into a rotary quern and the enhanced limpet hollows removed in some places (Figure 42). This later re-making was unfinished or abandoned due to breakage across the incomplete perforation. An unfinished saddle quern from Dryburn Bridge has four natural circular indentations, two on its face and two on its circumference (DB79 538), though we cannot be sure if the intention was to leave these hollows or re-dress the surface. A well used upper rotary quern from Phantassie had pecked hollow decoration and radial decoration on its non-grinding face (SF 563). This quern was then laid on the near inside

**Fig.42:** A re-worked saddle quern from Broxmouth (FWY) made from medium-grained old red sandstone. The limpet hollows on this saddle quern had been enhanced by pecking with a chisel. Later on the circumference was re-dressed to make it into a rotary quern and the enhanced limpet hollows removed in some places. This later re-making was unfinished or abandoned due to breakage across the incomplete V-shaped central perforation. (photographs: M Maxwell)

corner of the central building, with its decoration showing (Lelong 2008: 162, fig. 7.16 p.164). A rotary upper quern from Knowes was deliberately placed with its limpet scars, pock-marks or pecked hollows showing (Haselgrove et al 2009: 71 fig.5.5).

Limpet scarring and pecked hollow decoration is considered an Iron Age, or perhaps earlier, regional decorative tradition for south-east scotland (Type 3 in McLaren and Hunter 2008: 113-114). Complex ring and cup Neolithic rock-art carvings were found on the north east side of Traprain Law overlain with incised linear carvings (Edwards 1935). A panel with eight pecked cup and ring marks with faint rosettes, chevrons and lozenges was discovered during the 2005 excavations to the south of the summit under the floor of an Iron Age building, parts of which would have been clearly visible to some Iron Age inhabitants (Armit et al 2006: 604). A cupped stone from Knowes was made from a re-used Neolithic cupmark rock-art fragment (Heslop et al 2009: 127, Hunter 2009: 141). The ancient rock-art to people at Traprain Law in the Iron Age was perhaps part of the same vocabulary as the limpet scarred, hollowed and cupped slabs, saddle and rotary querns found in the fabric of contemporary structures. Examples of visible limpet scarred slabs can be found in Area 8, Phase 6 at Broxmouth, an area of paving located between Houses 2, 3 and 7, and in the walling and stone paved floors or levels of Houses 2, 4, 5 and 7, all Phase 6, from Broxmouth (Figures 51 and 52). Additionally, the burial with context code MAB in the cemetery to the north of Broxmouth in Phase 5, has a slab with visible limpet scarring as part of its cist structure (Figure 50). The lack of stone construction in earlier phases at Broxmouth explains the absence of limpet scarred slabs and stone objects in the timber constructed and non-paved stages of Houses 1, 2, 3, 5 and 6 at Broxmouth and the earlier timber/ stone composite stages of Houses 4 and 7. In these earlier stages stone objects are only occasionally found in pits or part of the rubble rampart cores, for example two fragments of a lower rotary quern (BZQ), one of which has certainly been blackened by heat, found in pit DDX in House 2 and the cupped stone blocks FBK and FAO in pits JIS in House 4 and HDS in House 7 respectively.

Similarly, the presence of naturally decorative stones does not seem to be specific to particular structures or phases at the other sites across Iron Age East Lothian, and are simply present where stone is used for construction. A flat stone slab with concentrated area of circular pecking on one face, possibly used as a mortar as well as decorative, is incorporated into the wall of a sub-rectangular structure at Thistly Cross (Innes 2008: 131 and 133 fig.6.15). Additionally at Dryburn Bridge there are limpet scarred stones found in the paving sealed beneath abandonment deposits in House 2 in which charcoal from wood posts in the inner ring groove terminal were dated to 770 to 400 cal BC though it is possible the house remained in use post 400 cal BC since old wood may have been re-used in a second phase of construction (Dunwell 2007: 61) (Figure 36). Limpet scarred hollowed stones and objects were part of the general constructed stone fabric of the East Lothian Iron Age, from the continued appropriation from the local shores and re-use of on-site stones and slabs.

## 5.5 Exploited affordances

### 5.5.1 Manufacture and modification

The majority of artefacts, from cobble tools to saddle querns, were modified only through use. In fact there are no clear examples of stone artefacts where the form,

**Fig.43:** Rotary quern upper from Traprain Law with a replacement handle (no code). The grinding face and both handles are very worn. Not to scale. (photograph: M Maxwell)

decoration and wear seem to be inconsistent with the natural properties of stone. The heavily modified and standardised stone balls, shale domes and polished (not through use) discs still exploit the weight, texture and colour properties of stone.

The saddle and rotary querns, cupped blocks and working surfaces were made from medium-grained to coarse-grained sandstones, often with quartz, ferritic or fossil inclusions, or of basalt, quartzitic-dolerite or trachyte. All of these stones have abrasive qualities. These larger objects made of coarse-grained to medium-grained sandstones or volcanic erratics will have required relatively more effort to work than the fine-grained stones and shales which make up the rest of the assemblages. There are five unfinished querns at Broxmouth with limited or crude faceting, of which two probably broke during manufacture across their perforations (FGA, FNB, CTE, FBS/ELT, FND, FWY), one from Traprain Law (GV 1537), and one from Phantassie which broke during manufacture (SF 231) unusually has a rectangular perforation made using a chisel. Additionally many saddle quern faces show evidence of re-dressing at Broxmouth (FUC, EEU, DPL, FAK, DDQ), at Knowes (SF 132), at Eweford Cottages (SF 58) and at Traprain Law (BB 129). Replacement handle sockets were added onto two rotary querns from Broxmouth (DPM two fragments of an upper rotary quern with decoration and FNC a fragment from an upper rotary quern which was re-used with a smaller lower rotary quern (McLaren in prep. 2013)). At Traprain Law there are three, perhaps four (there is a trace of a beginning of a handle shaft on GV 1537), examples of attempts to replace handle sockets on upper rotary querns, one of which was successful and the other abandoned due to a natural fault in the stone (CR.WF 56, GV 1048 and no code) (Figure 43). Other examples known are no less than four handle sockets on an upper rotary quern from Knowes (SF 104), and a single additional socket on an upper rotary from Phantassie (SF 72). It is also interesting to note that when decoration is found, it is on coarser grained objects excepting the whorl with radial incisions from Traprain Law made of fine-grained sandstone (GV 188) (Figure 44). Despite what may look like limited working at first glance, in fact there is clear investment in the physical act of pecking, dressing, re-dressing and decorating these coarse-grained objects and in keeping them in use.


**Fig.44**: Whorl from Traprain Law (GV 188) with radial decoration. (photograph: M Maxwell)

The slices of shale locally available from the East Lothian coast-scape are compact and thick enough for working into the objects we see represented in the East Lothian Iron

Age assemblages; bangles, domes, whorls/weights and other perforated objects. Traprain Law produces the most evidence for unfinished shale objects and working debris leading to the suggestion that it was a centre for production (Hunter 2008: 258-259, 10.2) (Figure 45). Metal blades were used to facet chunks of shale to shape and to perforate. There is also good evidence for manufacturing in the Broxmouth worked shale assemblage, showing the use of metal or flint blades to roughly facet slices of shale to shape, abrasion to smooth the surfaces and then the use of a lathe or handheld drill to perforate; the perforations in some cases are particularly uniform suggesting the former (Figure 47). These methods of working created friction, possibly sparks and when shale is heated it gives off a very unpleasant methane-sulphuric smell and so working was likely a smelly business. Shale is easier to work when wet and perhaps the use of a waxy substance like beeswax, fat or grease would have aided smoothing and polishing, giving some of the objects their lustrous sheen which is still evident (Figure 46).

**Fig.45:** *Left* GV 193 a lump of shale from Traprain Law facetted and chipped by use of a metal blade. *Right* Perforated shale GV 192 (wrongly labeled on object as GV 162) also from Traprain Law. A metal blade has been used to facet and incise the perforation. (photographs: M Maxwell)


**Fig.46:** Fragment of a highly polished shale bangle FXK from Broxmouth. (photograph: M Maxwell)

**Fig.47:** Selection of unfinished perforated slices of shale from Broxmouth.
(photograph: M Maxwell)

Fine-grained sandstones, siltstones or claystones are easier to work and can be abraded, carved and perforated without much physical effort. Cobble tools for sharpening, grinding, pounding or smoothing/polishing were only modified through use. Tablets and discs have been modified to shapes which do not reference the original source boulder, slab or stone fragment that they originated from. In addition, there are three strange triangular objects 1922.209, 1922.21 and GV 226 from Traprain Law. Few elongated cobbles used as hones and possible smoothers from the East Lothian Iron Age have been perforated (drilled from both sides) (GV 104 and GV 496) and a trapezoidal cobble grinder 1922.264 has an incomplete perforation visible on one face, all of which are from Traprain. The faces and edges of GV 1166, GV 813, GV 1523, GV 343 from Traprain Law and 69 from Newmains have all been planed through abrasion.

Many of the perforated discs (whorls and/or suspended weights) and non-perforated sub-rectangular tablets and discs (probable palettes) from Iron Age East Lothian have been worked in the same way. Some of the sub-rectangular tablets and discs may even be unfinished whorls/ weights; both have their edges or circumferences and faces facetted/ chipped and then were often ground. These objects have a longevity in the archaeological record: whorls/ weights are found in Phase 3, 5 and 6 at Broxmouth, while whorls/ weights from contexts with associated radiocarbon dates from 352 cal BC to 560 cal AD (AA-25727, AA-25737, AA-19640, AA-25731) were found at Fisher's

Road East and West, suggesting common crafting know-how.  However, due to the paucity of whorls from other Iron Age East Lothian sites it is unclear whether there are any patterns of preference for specific perforation diameters or weights, limiting interpretation of possible textile working. Nevertheless, two different levels of working are evident. The perforated discs have uniform and neat central holes which are sometimes chipped before drilling from one or both sides. Other portable whorls or weights are donut shaped and are not as heavily ground down. Chipping is more frequently detected around the latter's drilled hourglass perforations.

There are two unusually worked examples from Traprain Law, a slightly convex whorl/ weight (GV 623) which has four bore drilled central perforations on both sides which come together and narrow to form one central perforation, and an unfinished shale whorl/ weight which has been facetted and perforated using a blade (GV 192). Both convex and disc forms were found at Traprain Law (out of the stone examples examined 19 were convex and 65 were discs), St Germains (all three sandstone, one disc SF62 and two convex SF 78 and SF 602 though described as discs in the report Alexander and Watkins 1998: 34) and at Broxmouth (all five sandstone, three convex and two discs). Otherwise only two perforated discs were found at Phantassie (SF 19 and SF 620). Unfinished whorls are present at Broxmouth (FSZ) and at Traprain Law (GV573, GV 353, 1922.270 O2, GV 1157). It is perhaps interesting that the majority of whorls are from Traprain Law, but this may be due to the favourable preservation conditions of this site.

Both disc and convex perforated discs have evidence of use-wear and there does not seem to be a functional preference for either convex or disc forms. The weight (not recorded for the St Germains and Phantassie examples) of both discs and convex whorls range widely from 1.31 g to 68.4 g and the perforation diameter (not recorded for St Germains) from 2.5 mm to 13 mm. The heaviest shale example weighs 33.09 g (GV 1175 from Traprain Law), whilst there are six heavy outliers; a sandstone convex whorl/ weight from Broxmouth dramatically weighs 186.22 g, and another sandstone convex whorl/ weight from Traprain Law weighs 88.38 g, while there an additional four which are substantially heavier (DNF and GJL are unfinished, CTD and EIQ with complete perforations) all also with convex rounded forms and with hourglass perforations pecked from both sides. All weights/whorls from Broxmouth were made from sandstones, while of those examined from Traprain Law 62 were made of sandstone, 16 shale, 12 of roman pottery, nine of metallic material, four of fired clay, four claystone, four mudstone and one igneous black rock. This reflects the general availability of types of stone present in the East Lothian worked stone assemblages overall and is indicative of efficient use of varied resources exploiting their natural forms and mass.

As previously mentioned, Iron Age stone balls are undecorated and show no use wear but have been heavily modified to be spherical in shape. These enigmatic objects have a wide distribution across Iron Age Britain, though are particularly well known from south-east Scotland (Alexander and Watkins 1998: 236) and have been suggested to be sling shots (e.g. Cunliffe 1984: 425), gaming pieces (Close-Brooks 1983: 222; Cool 1982: 95-6) or weights (Mann 1914). In East Lothian 116 stone balls have been found from five sites, 103 of which are from Broxmouth alone. The stone balls at Broxmouth are found in Phase 3 (28% of the stone balls recovered), Phase 4 (5%), the majority in Phase 5 (39%), Phase 5/6 (6%), Phase 6 (7%) and 15% from topsoil or unstratified deposits. The stone balls from Traprain Law are found in all levels of Curle and Cree's excavations, and a singular stone ball was found in the Early Iron Age phase at St Germains in the wall slot of a house (Alexander and Watkins 1998: 226-227). These stone balls are all made of varied colours of locally available medium-grained sandstone and none show use-wear (Figure 38). Unfinished examples from Broxmouth show that they were made by grinding a pebble of sandstone into a facetted hand-held size and then grinding down the corners and pecking the surfaces to make a sphere or squashed sphere shape. Their widths fall in the range of 27mm to 56mm and they all vary in weight between 13g and 232g. Due to this high level of variation, it could be that the value of these objects lay in their haptic or material qualities rather than consistency in form or weight (MacGregor 1999: 264). MacGregor has argued this for Late Neolithic and Bronze Age carved stone balls from North East Scotland, by moving beyond "occularcentric" (ibid.: 263) studies of their decoration to considering their texture, hot or coldness and motion (ibid.). The Iron Age stone balls may have been valued for their texture, roundness, portability and hues of pinky greys to orangey reds. The grinding down of these objects enhanced the natural textures and colours of sandstone. The medium to fine-grained sandstone used is warm to touch and some of the balls are very smooth, perhaps from repeated handling.

*Decoration*

Decoration or heavy modification of stone artefacts is rare. The bases of both saddle and rotary querns are undressed and their bodies, if modified at all, generally only have roughly hewn circumferences. Enhancing natural limpet scars is evident on lower rotary quern EIT and unfinished rotary quern FWY from Broxmouth (Figures 35 and 41) and possibly on other examples from Phantassie and Knowes (Appendix 1). Abstract decoration found on stone artefacts is rare; at Broxmouth a cupped block (FGH) and four rotary querns (two upper (DPM, EIT), one lower (FWY) and one unknown (EBZ)), and on only six other Iron Age objects in East Lothian (three upper rotary querns, three sandstone slabs and a whorl) (Appendix 2). All of these 12 objects, except the weight/ whorl are made of coarse-grained sandstone. The majority, therefore, were interacted with in a rotary motion during use; the weight/whorl will have spun when suspended, the arm and hand with cobble will have rotated the grain around the cup, and the upper querns were rotated by a handle for grinding. The most common form of decoration were incised lines in parallel or geometric designs around the edges of artefacts or radiating from central perforations (e.g. Figure 42 and Figure 48). This motif can also be seen around the head of the antler ring headed pin from Broxmouth (FXV) (Box 3). On querns it is possible that these groove incisions are sometimes the result of re-use as sharpening stones for metal blades (e.g. DPM, Figure 48). The link between decoration/ grinding of metal tools and perforated objects, which spun or were used in a rotary action was perhaps significant.

**Fig.48:** *Left* rotary quern upper from Traprain Law (GV 1497) with pecked radial decoration. *Right* one half of rotary quern upper (DPM) from Broxmouth, found in the secondary paving of House 4, Phase 6. The linear grooves, which are also an attractive decorative feature, were probably made by sharpening metal blades or bone points. Not to scale. (photographs: M Maxwell)

Where accurate context information is available, these stone objects were found in structured deposits. An upper rotary quern was laid deliberately in the corner of a building with its radial linear and pecked hollow decoration showing, other objects were re-used in paving or cobbling and included in a closing infill of a pit. Cupmarks in Neolithic rock-art are thought by Thomas and Tilley (1993: 251) to represent female breasts, evoking the anthropomorphic quality of stone (ibid.: 255). The cupmarks in this instance are found in tombs whose architecture is argued to be in the shape of a skeletal torso (ibid.: 225-324), and therefore as structural embodiments of the dead. Neolithic tombs are also argued to be associated with the handaxe; its shape is often carved onto tomb architecture (ibid.). In this example, portable stone objects, stone architecture and bodies are inseparable. Despite a lack of funerary architecture from the British Iron Age, there are links between structured deposition and decoration; the cup-marked mortars and querns (including naturally limpet scarred querns) which were built into the settlement fabric of the East Lothian Iron Age can be thought of in a similar way, as physical embodiments/entombments of individuals. This references the Iron Age practice of depositing disarticulated fragments of individuals on-site, for example the fragmented human remains found in the interior at Broxmouth.

*Skeuomorphs*

Standardised black pedicle domes made of shale are found at Traprain Law, and can be considered skeuomorphs. These are indexical in form, texture and colour to the domes at Broxmouth made of antler pedicles which were deliberately heated to be black in colour (Box 1, Chapter 4 in Section 4.5.1). As in the antler examples the shale domes had grooves for pin shanks, with two examples still with iron pin shanks in place (shale dome GV 1445 and antler dome DKX). The shale domes were ground down and then polished, the same as the antler pedicle domes.

The fired clay examples of convex or disc shaped whorls/weights can be considered as skeuomorphs. They too have hourglass perforations with diameters ranging 4 mm to 9 mm, but these must have been worked from both sides before the clay was fired when it was dry and hard. This method of manufacture mimics the drilling of stone. Additionally, the whorls/ weights made of samian and Roman pottery utilise the flat areas from vessels; there is a preference for bases and body sherds though there is at least one example from Traprain Law made from a samian rim sherd (GV 1909). Metallic examples from Traprain are also convex and seem to be worked in a similar way to the fired clay weights/whorls; their perforations made from both sides, wear suggesting that this was done while hard (GV 355 has an incomplete perforation). Weights range from 8.6 g (samian GV 865) to 50.7 g (fired clay GV 70), and thus fall within the range of whorls/ weights made of other materials, predominantly stone.

### 5.5.2 Use-wear: layered and curated

All assemblages from Iron Age East Lothian show a high level of breakage; over 25% of all stone objects at each site are broken fragments (Table 11). It is clear that a significant proportion of these objects were broken before deposition. When considering the types of objects which have ancient breaks at Broxmouth and Traprain Law interesting differences are evident. At Broxmouth the majority of broken artefacts are querns, saddle and rotary, cupped blocks or rubbing stones. Upper rotary querns mostly break at their weakest point across their perforations. Saddle querns, rubbing stones and cupped blocks have fractured faces or edges. Whereas at Traprain Law the majority of broken artefacts are cobble tools, and there are no broken querns. However, rather than this being of any real significance, it is probably a reflection of the lack of stone buildings found here and additionally due to biases in human recovery during excavation. Many of the larger stone artefacts do not seem to have been kept during Curle and Cree's excavation at Traprain Law since recent excavation has uncovered the majority of larger stone objects including querns (Hunter *pers comm*). There are no Late Bronze Age/ Iron Age stone construction episodes which have yet been fully excavated at Traprain Law. Indeed, there is bias in the dataset recovered from Broxmouth; the saddle and rotary querns were predominantly found in rubble infill contexts in the rubble infill of ditches in Phase 3, possibly associated with feasting deposits (Chapter 1) and in paving, floor and construction of houses in Phase 6. Nevertheless, there is a greater breadth of smaller broken and fragmented stone objects at Traprain Law, perhaps indicating a difference in how they were used or a deliberate practice of fragmentation prior to deposition.

The cobble tools from all the East Lothian Iron Age sites examined show layered use-wear, indicating that they had long biographies. Different types of use-wear were often found on the same cobble, indicating that these objects were valued for their adaptability. Smoothing (rubbing and polishing with associated sheen or gloss), abrasion (grinding or pulverising a coarser material, no associated gloss or sheen), impact (pecking, pounding or hammering) and breakage were the most common types of use-wear found. Staining or residue was associated with smoothing or use as a hone, except in exceptional cases were pigment was found (discussed above in Section 5.4.1). Table 9 show the types of use-wear found on the cobbles at Traprain Law, Broxmouth and the other assemblages from East Lothian Iron Age. A strikingly similar pattern of usage is detected on the cobbles from Broxmouth and Traprain Law, and the published catalogues from the other East Lothian sites suggest that this pattern of usage is regional.

Smoothing, abrasion and breakage are also common on other stone objects (Table 10) including discs/tablets, whorls/weights and stone slabs used as working surfaces. Therefore it was not only cobbles which were valued as adaptable, but artefacts modified prior to use. A whorl/ weight from Traprain Law was re-used as a grinder, its perforation is worn and it has a bevelled ground facet on its circumference (GV 1287) (Figure 39). Two other whorl/ weights from Traprain Law have also been used as rubbers, with worn down facets and associated glossy residue (1922.310 N3, and GV 1243). Discs and tablets were used as small palette grinders or smoothers/ rubbers fulfilling a similar function to the larger non-portable stone slabs.

Heating was detected on seven objects from Traprain Law, four lower rotary querns from Broxmouth, and one lower rotary quern fragment from Knowes; in total only amounting to 1% of objects analysed from East Lothian (Table 10). Deliberate sacrifice of an artefact is the case in at least one example from Broxmouth: BZQ was broken in half before being re-united in deposition into the same pit in House 2, Phase 6, one half of which has clear evidence for burning on its grinding face and as discussed below (Section 5.5.3) this may be an act of transformation marking the end of their use-lives as querns.

### 5.5.3 Re-use

Transformation through a change in use is common. Layered episodes of different types of use-wear showing adaptability and long biographies are evident particularly on the cobble tools, and also on some of the whorls/weights (as discussed in 5.5.3). Re-dressing the grinding faces of rotary querns to keep them in use is evident; six from Broxmouth clearly show this (FAK, DPL, CTE, EVA, DND and EEW) and SF 132 from Knowes (Heslop et al 2009: 124) and SF 58 from Eweford Cottages (McLaren and Hunter 2008). Additionally a fragment of an upper rotary quern (SF 46) from Knowes and a saddle quern (SF 6) from Whittinghame have both been re-dressed and squared off into blocks perhaps for a different use (Heslop et al 2009: 123-125). Otherwise, re-modification is only definitely evident on 1% of the Iron Age worked stone from East Lothian (Table 11).

Additionally, a few examples of re-modification are found at Broxmouth and Traprain Law. A large limpet scarred block of old red sandstone (FWY) from Broxmouth has one face which is well worn smooth in patches and also it is clear that attempts were made to make it into a rotary quern (Figure 42). The attempt to turn it into a rotary quern was abandoned because of breakage across the incomplete perforation. Perhaps it had been a paving stone or rubber first or after the attempt at manufacture failed. Additionally, some of the limpet scars had been enhanced by pecking. However, at some point the face and circumference has been re-dressed to remove the limpet hollows during manufacture into a rotary quern. There are more examples of querns which were re-worked, because of problems occurring during manufacture and as a means to extend use-life. Upper quern stone FNC from Broxmouth was re-used as a lower stone with a non-matching upper stone with narrower diameter (McLaren in prep. 2013), there is a dished facet towards the centre of the quern encircling the grinding face. FNC was not used as an upper stone because during manufacture the stone had sheared off around the addition of a hopper, and rather than throw it away a spindle socket was added in the centre so it could be used as a lower (ibid.). There is an example of an unfinished upper quern from Traprain Law which was modified and re-used as a lower stone (ibid.; GV 1537). The handle socket on upper rotary stone DPK was damaged, perhaps putting it out of use, but the concavity of its grinding face may suggest re-use as a lower stone.

Additionally, arguably re-use prior to deposition is found on some of the saddle and rotary querns too. The rotary quern fragments previously discussed in Section 5.5.1 may in fact not be primarily decorative but their longitudinal incisions could be sharpening grooves (EBZ and DPM). Due to the level of post-depositional erosion it is difficult to be sure which is the case, though the positioning of these possible sharpening grooves on the body and non-grinding surfaces of the quern nevertheless has a decorative quality. Sharpening may also be a third interpretation for the groove on quern SF 41 from Knowes (Heslop et al 2009: 127), as opposed to a deliberate attempt at breakage or to facilitate the movement of grain. Three other Broxmouth upper rotary quern fragments have seen secondary use; EEU has a patch of abrasion unrelated to rotary use as a quern, but perhaps from the sharpening of bone or metal points (McLaren in prep. 2013), DNA has an area of rubbing on its grinding face associated with gloss, whilst part of its base has been pecked off and FBI has longitudinal sharpening grooves across its grinding face. One almost complete lower rotary quern DDP has three longitudinal grooves possibly from sharpening bone or metal tools on its grinding face and has also possibly been used as a working surface. Stone objects were repeatedly transformed through use.

*Fragmentation*

Deliberate breakage and perhaps defacing can be argued for many of the rotary querns uncovered at Broxmouth. Deliberate defacing of querns for a reason other than for re-use can be argued for the examples from Broxmouth listed in Appendix 6. Additionally saddle querns FWH and FGF from Broxmouth have part of their bases detached, and corners were detached from the grinding face of lower rotary quern FUB (Figure 49) and the body of upper rotary quern DDQ. The associated grooves with the fracturing of upper rotary quern DPN from Broxmouth may, however, indicate plough damage rather than deliberate breakage. On lower rotary quern SF 41 from Knowes a slight groove

**Fig.49:** Lower rotary quern FUB from Broxmouth. The corner of its grinding face is fractured and missing at one corner, and it is argued that this may have been a deliberate performance of fragmentation. Not to scale. (photograph: M Maxwell)

running across the grinding face from its centre to the edge has been interpreted as an addition that would facilitate grinding and movement of flour to its edge (Heslop et al 2009: 127), however equally it may be that this is evidence of deliberate attempts to deface or break the quern. Two fragments from lower rotary querns BZQ and FGJ from Broxmouth are blackened and burnt from intense heat, BZQ is then re-united with its refitting counterpart fragment in deposition in a pit in House 2, Phase 6. The two fragments of BZQ refit almost completely and one had clearly been exposed for a long time and damaged before finally included in pit infill (McLaren in prep. 2013).

Traces of burning are also found on a fragment of a lower rotary quern from Knowes (SF 65) which matches non-burnt but smashed upper SF41 found in a house abandonment context diametrically opposite, perhaps deliberately placed to reference its counterpart (Heslop et al 2009: 127, Willis 2009: 123). Burning was perhaps from use close to a fire or the grinding of burnt material, or deliberate breakage using fire to end this stage of the quern's use-life. There are four instances at Broxmouth of refitting fragments from the same quern stone found in the same contexts (DVR and FBI rotary lower, FWW and FWW1 saddle, FWU saddle, BZQ lower rotary). Saddle quern FWW was in two parts, one sealing pit and the other in the upper fill of the same pit in Structure A in the Inner Ditch Rampart during Phase 1, in positions which demonstrate they were fragmented before deposition. The context information recorded in the Broxmouth archive is not specific enough to determine whether FWU, which was recovered in two fragments from a shallow depression in Structure A, Phase 1, may have been broken pre or post-deposition. Both fragments of BZQ were broken prior to deposition and were found as rubble fill in a pit in House 2, Phase 6. Similarly FBI with subsequent sharpening grooves on its grinding face was found deliberately placed sealing a feature in House 3, Phase 6, whereas its refitting counterpart DVR with no traces of secondary wear was found in an associated rubble context.

In some cases, then, deliberate breakage ended one phase of these objects' use-lives as querns. Fragments were divided and went on separate journeys of human-material engagements, perhaps owned by different individuals, and then were occasionally reunited in the communal construction of houses. The instances of depositing refitting rotary querns in the same context suggest that previous use-lives were remembered in new contexts of re-use. Rotary querns were designed primarily for use in pairs (upper and lower), and their partitive division in re-use, deposition and fragmentation may have been involved in restructuring relationships in life and/or death, conceptualised as parallel to each other (Fendin 2000, Lelong 2008: 264). More generally across Iron Age sites in East Lothian, all rotary querns are found in fragments or without its matching lower or upper.

**5.6 Deposition**

Contextual information is lacking for the worked stone assemblage from Traprain Law, otherwise throughout the Iron Age the worked stone objects from Broxmouth and the other sites in East Lothian were found in the rubble and midden infilling of pits, post-holes or rampart core and in contexts related to episodes of stone structure construction (walls, paving, cobbling, house ring ditches), collapse and abandonment. The deposition of worked stone was both pragmatic and part of structured acts, as will now be discussed.

The shale was mainly found in midden layers in the ditches, midden spreads in the interior or from post-excavation recovered deposits at all sites, except at Phantassie where chips from shale working were packed into the base of a Phase 4 posthole, and an unfinished shale bracelet was found lying in the Phase 5 yard area dated to cal AD 80-340 (SUERC-5614) (Lelong 2008: 179, 191-193). Similarly there is one broken bangle fragment (FBQ) found in a posthole in Phase 3 in the South West Entrance at Broxmouth. The building at Phantassie was not directly dated but respected features associated with another structure dated to c. cal AD 50BC- 120 (SUERC-7345).

Frequently, smaller stone cobble tools, whorls/weights, discs and stone balls are found in midden contexts in which bone is also recorded. This is the case at Broxmouth, Phantassie, St Germains, Fishers Road and South Belton. At Broxmouth the stone balls were found in the midden ditch infills concentrated at the South West Entrance and in the Inner Ditch to the west, while other small stone objects were found in ashy layers; a basalt pebble object used as smoother/ polisher (GIM) and broken shale bracelet fragment (GFB) were found in a buried soil sealing Structure A, Phase 1, and multiple shale fragments, two sandstone blocks (DNF and DXZ), a cobble used as a smoother (EER) and a whorl/weight (FSZ) were all found in the midden sealing this occupation in Phase 5 of the Inner Ditch (context CBJ). Midden was moved around site, particularly during Phases 5 and 6 at Broxmouth as previously discussed in Chapter 4, and was also re-used as rampart construction material as documented in Phase 3 (700 cal BC to cal AD 200) at Fishers Road West (Haselgrove and McCullagh 2000: 16, 26).

At Broxmouth stone was liberally used to make burial structures, forming an orthostatic cist for the Phase 3 burial of a woman in the South West Entrance, and as a superstructure over burials in the cemetery, in Phase 5 (Figure 50). Two cobbles (KAO and KAJ, broken) used as polishers, rubbers or hones were found in the cemetery area (the exact context is not known for KAO, while KAJ was found in a pit). A worked stone was found in a pit burial dating to 800-400 BC at Dryburn Bridge, but context information is not good enough to determine whether it is intrusive or not (Dunwell 2007: 65-67). Disarticulated human remains are found in the midden below the stage 5 wall in House 4 (left frontal, fragment No.19 and mandible fragment and teeth, fragment No.14), in the same context as two roughly hewn cupped stone blocks (DHU and DHV) and two worked bone fragments (handle COI and point DFU). The human left frontal fragment in this context was directly dated to 50 BC- AD 90 (GU-18737). Elsewhere at Broxmouth and more generally in the East Lothian Iron Age, disarticulated human remains are found in occupation or abandonment midden and rubble infill contexts, in which worked stone, worked bone and faunal bone, and late prehistoric pottery are also often found. As discussed above (Section 5.4.2), these human remains may be assembled together with stone and these other materials in deposition to harness powers of transformation in life and death.


**Fig.50:** Burial MAB in the cemetery located to the north of Broxmouth Hillfort, the grave was radiocarbon dated to 380-200 cal BC. A limpet scarred slab (top left of slide) forms part of the cist superstructure, showing the local appropriation of stone. (photograph: Broxmouth Hillfort Project archive 1977-78)

In most cases if stone objects are found in paving, post-hole packing or pit infills they are associated with rubble, stone lining or reinforcement and therefore were fulfilling useful functions (as in Houses 4 and 7). At Phantassie fragments of four querns were built into structures, in a post setting, in paving of a formal entrance, into the settlement boundary and in cobbling all with their grinding faces down, three with their decorative features showing (Lelong 2008: 264), and a mortar built into a cobbled surface with its cup upwards (Lelong et al 2008: 178 and 155, fig. 7.9). Querns were used as post-pads at Knowes (Haselgrove et al 2009: 71, fig.5.5).

This was simultaneously likely beyond simply pragmatic re-use but may have been part of cosmologically meaningful deposits. Two refitting fragments of an almost complete but unfinished upper rotary quern (FBS) and (ELT) were included in paving; one in the primary paved phase in House 7 (ELT), and the other in Area 8 (FBS), both Phase 6. Placing an unfinished quern in static paving removed it from everyday use-life silencing the rotating and grinding, emphatically linked to ideas of productivity, fertility and bodily substances (discussed above, Section 5.4.2). Another example of signative reference to stone's materiality in deposition is a large pit (feature JCW) in House 6 which is rich in an unusual assemblage of finds. This pit is infilled with rubble and two distinct lenses of midden of hearth and ash material (ibid.). A broken rotary quern fragment (could be either upper or lower) made of sandstone with quartzite inclusions (FAW) is included in these deposits along with two bone points (EMS and EMS2) and three copper-alloy objects (CFS shank, CFS horse harness, ERW pin shank) and iron tang (EZW). This is one of only two groups of metal objects found at Broxmouth, the other group (iron rod CFA and iron bar FFH) is in the top fill of a long-lived and multiply re-cut pit JCH near to JCW to the West of House 6 (ibid.: 46-49), all the others were stray, isolated or topsoil finds. The grouped deposit of a broken quern made of quartzitic sandstone inclusions with metal objects in the rubble, midden and particularly ashy infill is perhaps significant, eliciting or muting their transformative powers embodied in fire or the ability of metal and quartz to spark when manufactured or broken. A quern formed part of a hearth kerb underneath the Cruden Wall at Traprain Law (Close-Brooks 1983) and this may reference the transformative powers of fire and querns, also expressed through the act of burning selected broken fragments of querns, discussed previously (Section 5.5.2), at Broxmouth and Knowes. Additionally, there is one instance of a quartzite object (EZM) used as polisher found in a hearth at Broxmouth in House 1, Phase 6. This may have been lost from use near a fire providing good light for activity, or it may be a deliberate deposition enacting or ceasing the materialities of fire and quartzite, which have the ability to spark.

Fragments from two separate upper rotary querns are found in the Phase 5/6 rubble ditch infills in opposite terminals in the Inner Ditch at the South West Entrance at Broxmouth (DPN and EKB). Their placing may be a deliberate attempt to reference each other, although it must be remembered that less than half of the querns and stone objects were given co-ordinates and can be plotted on plan. Cupped stone EIM and oval block CTD were also found somewhere in this same rubble deposit, but are given no co-ordinates. Nevertheless, it is interesting to note that both have damaged grinding faces, EKB is limpet scarred and DPN has weathered grooves on its grinding face, perhaps from deliberate fragmentation. However, plough damage or post-depositional exposure cannot be ruled out in this instance, since this is the second to last stratified sequence at Broxmouth in this area and so is near the topsoil.


**Fig.50:** Slide showing fragment of upper rotary quern FBI with grinding face upwards blocking a substantial post-pipe in House 3, Phase 6 at Broxmouth. (Broxmouth Hillfort archive 1977-78)

There are a few clear examples of structured deposition which suggest that taking stone objects out of everyday pragmatic use-lives would have been a significant act. A fragment of upper rotary quern (FBI) (which refits with DVR found in adjacent paving/ rubble) can clearly be seen blocking a very substantial structural post-pipe with its grinding face upwards, in House 3, Phase 6; perhaps sealing this feature marked the abandonment of the whole structure (Figure 51). A stone ball was found in a substantial post-hole in House 4 which was flanked with orthostats, interpreted as part of an entrance structure. It is not clear whether this was deliberately infilled or not, though it is probable since the post-pipe is not visible on section and the infill was recorded as a homogenous dark pink gravelly brown soil (Broxmouth Hillfort Project archive 1977-78). A body fragment of Type 2 pottery was also found in this context. In House 4 there is a large pit (context JIS) filled with loose yellowish brown loam which had within it a worked block with conical cup of fine-grained sandstone (FBK, object now lost) alongside an interesting assemblage of worked bone including two black domes (EYQ and EYR) and a perforated circular piece of scapula bone (FAZ) and fragments of horse bone. This is different to the midden or rubble most often used to infill pits, so

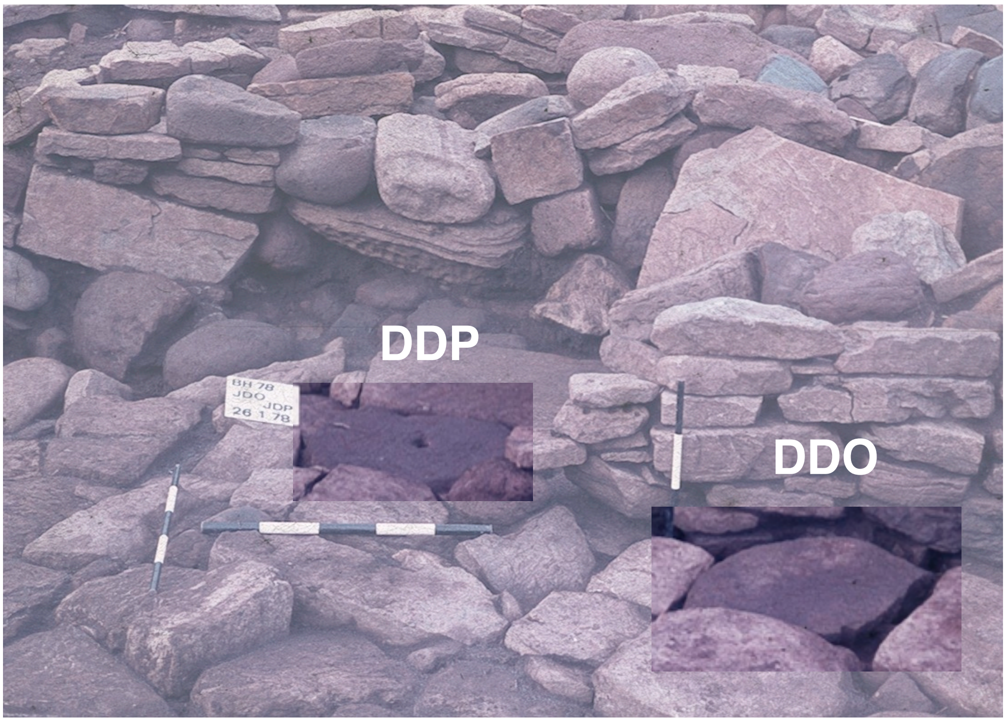



**Fig.51:** Rotary upper quern DDO and rotary lower quern DDP from the same phase of paving in House 4. (Broxmouth Hillfort Archive 1977-78)

this seems to be a deliberately assembled deposit. Two red sandstone balls (FFR and FFP) and a perforated piece of scapula (FFQ) were found in a boundary trench in House 4, situated north of the entrance of House 4. Querns DDP (lower rotary), DDO (upper rotary), DPL (upper rotary), DPM (upper rotary), and perhaps DPK (upper rotary) were all located in roughly the same part of House 4 but from different phases of paving (JEM and JEL), perhaps referencing and integrating previous phases in new construction (Büster et al in prep. 2013). The pit complex to the north of House 4 are possibly some of the latest features at Broxmouth (undated) (ibid.); included within these intercutting pits covered with the same mollusc spread are an unfinished limpet scarred rotary quern (FGA), a bone point (FKD), and an apparently deliberately placed worked antler in the upper fill (FDZ). In particular, taking an unfinished quern (with no other use-wear) out of use in this way would have been a significant act, and the deposition of a limpet and winkle spread on top may be a deliberate reference to the appropriation of stone to make querns from the coast.

The depositional positioning of querns in Phase 6 at Broxmouth may also be of importance, however less than 50% of saddle and rotary querns are recorded *in situ* on the slides in the archive. Out of this selection 17 were photographed in the paving of the houses, including one of two existing fragments (ELT) of an unfinished rotary quern broken across its incomplete perforation, the other half of this quern (FBS) is found in the paving of Area 8, Phase 6. Another unfinished rotary quern DNB is recorded in paving in House 7. Of the other 15, all of which are used querns, 12 were placed with their grinding faces placed downwards (FNA, FNB, FNC, FNE, BZQ, DPK, CTE, DDQ, DPL, DPM, DNA, DND) and there are only three exceptions placed with their grinding face upwards (DDO and DDP from the same phase of paving in House 4 (Figure 52)), and DNC from the same phase of paving as DNA and DNB in House 7). In paving in House 4 lower rotary DDP was placed with its three linear grooves on its grinding face visible, and in House 7 upper rotary DPM was placed with its incised decoration showing and upper rotary DNA placed with its limpet scars showing. Similarly, three upper rotary quern fragments from Phantassie (SF 72, SF 508 and SF 563) were placed grinding face down with decoration showing, including SF563 in a corner of a building with its decoration of pecked hollows and radial designs (Lelong 2008:162 and 164, fig. 7.16). Similarly a rotary upper quern fragment from Knowes (SF 104) was deliberately placed in paving with its limpet scarred and pecked hollows showing (Haselgrove et al 2009:

**Figure 53:** Well-worn lower rotary quern (FGJ) broken across spindle socket used as an orthostat in wall slot JAH in House 3. (Broxmouth Hillfort Project Archive 1977-78)

71 fig.5.5). Quern FGJ is used as an orthostat in wall slot JAH in House 3, with its grinding face placed against the cut of the feature (Figure 53).

Elsewhere at Broxmouth, only three querns found in the Phase 6 Area 8 paving are photographed *in situ*; two with their grinding faces upwards (FNK, FNL) and one unfinished fragment (FBS) broken across the perforation, the other half which is found in the secondary paving of House 7 (ELT). This does not seem to be for practical reasons, since FNK is a saddle quern so could not be used *in situ* easily and FNL is an upper rotary quern with no evidence for re-use as a lower. Their inclusion here may be part of a different depositional pattern, but this is impossible to determine since this area of paving is badly recorded and only three out of 10 querns included in the Area 8 paving had their positions recorded, in part due to plough truncation and an excavation methodology focusing on the House structures and neglecting external features. In the South West Entrance at Broxmouth a fragment of a lower rotary quern EUA is found with its grinding face upwards sealing a pit (context BGU) and part of a small patch of paving resurfacing the Phase 5/6 roadway.

There are three examples of refitting quern fragments found in the same contexts at Broxmouth (FWW and FWW1, FWU, BZQ). Upper rotary fragment FBI was found deliberately placed sealing a feature in House 3, Phase 6, whereas its refitting counterpart DVR was found in an associated rubble context, although only one is clearly evident on slide, see Figure 51). The grinding face of FBI has longitudinal grooves from re-use as a sharpener on its grinding face, not present on its refitting partner DVR. The two fragments of BZQ refit almost completely; one has clear evidence of exposure to heat or burning on its grinding surface (there are traces of this on the other half too) and both have been exposed for a long time and damaged before finally being included in pit “filled in at once, and area trampled/worn out on S side filled in simultaneously to level area” (Broxmouth archive context record).

Similarly, at Knowes refitting upper and lower rotary quern fragments (SF 41 and SF 65), the upper smashed into five fragments, were all found in close-by deposits; the complete lower with traces of burning on its grinding face had been placed flat with grinding face upwards in the surface of the eastern ditch (SF 65) and the smashed lower was found in the abandonment deposits of structure CS2 (SF 41) in which there were also several ‘smashed and scattered’ fragments from the same Roman flagon. These fragments are thought to be the remnants of a closing feasting event (Haselgrove et al 2009: 89-90). This has also been linked to the structured deposition of an Iron Age coarseware pottery rim fragment set into the surface of the southern ditch terminal at this site (Hunter 2009: 140). Therefore, fragmentation ended one use-life phase of querns. Matching pairs of lower and upper rotary quern stones are extremely rarely found in the same contexts, and so these instances of depositing and re-uniting refitting querns in the same or related contexts suggest that only occasionally previous use-lives were remembered in new contexts of re-use.

**5.7 Conclusions**

The types of stone used for craft and everyday activities were all readily available across East Lothian in the Iron Age. The type of stone from furthest afield in the East Lothian Iron Age assemblages are two saddle quern fragments EKC and FVB from Broxmouth, which were made of markle type basalt originating from south-east

Scotland. Despite the general availability, people were still making choices about which type of stone to appropriate. For example, even though Broxmouth was built upon limestone which be seen today eroding out of the coastal landscape in the region (Figure 31), it was not used by people in the Iron Age of Broxmouth and East Lothian for artefacts. Furthermore, only medium to fine-grained sandstones or basalts were used to make saddle and rotary querns, cupped mortars or blocks for grinding and only coarse-grained stones were decorated. Locality was expressed on the objects themselves. The coast or river scapes were embodied in many of the stones appropriated for use, the saddle/ rotary quern EIT even has its limpet scars enhanced.

Therefore, texture was clearly valued in addition to their colours; the stone balls effectively embody these qualities. Another perceived affordance was stone's transformative powers, linked to activities involving heat (mainly metalwork) or other materials with electro-static properties. For example, a circumferential quartz grinder was found in the hearth of House 1, Phase 6 and a quartzitic sandstone fragment from a rotary quern was found alongside a group of metal artefacts in a pit near House 6, at the end of Phase 6. It is possible that stones were conceived as bodies or bodily substances and as having the ability to cure human ailments.

Despite limited modification in most cases, artefacts in the worked stone assemblage had long biographies, many show layered and different types of use wear and the majority were found in contexts of re-use in construction. They were valued for their adaptability and durability. This may be seen in most cases as efficient re-use, although there is striking evidence for some querns having been repaired and re-dressed, and some deliberately fragmented before inclusion in pits, postholes, walls or other building features (BZQ and FBI are particularly interesting examples). Over one quarter of the worked stone assemblages from East Lothian Iron Age assemblages are broken or fragmented, and it is argued that the majority were broken in antiquity before ending up in the ground.

In summary, artefacts of stone were transformed to take on new significances and were deliberately kept in use. Sometimes previous use-lives were remembered in new contexts of re-use, exemplified by the examples of depositing refitting fragments of querns in the same context. Worked stone artefacts were found in midden contexts throughout the phases Broxmouth, or as re-used in buildings, stone or rubble packing and construction of buildings in Phase 6. This is also the case elsewhere across Iron Age East Lothian.

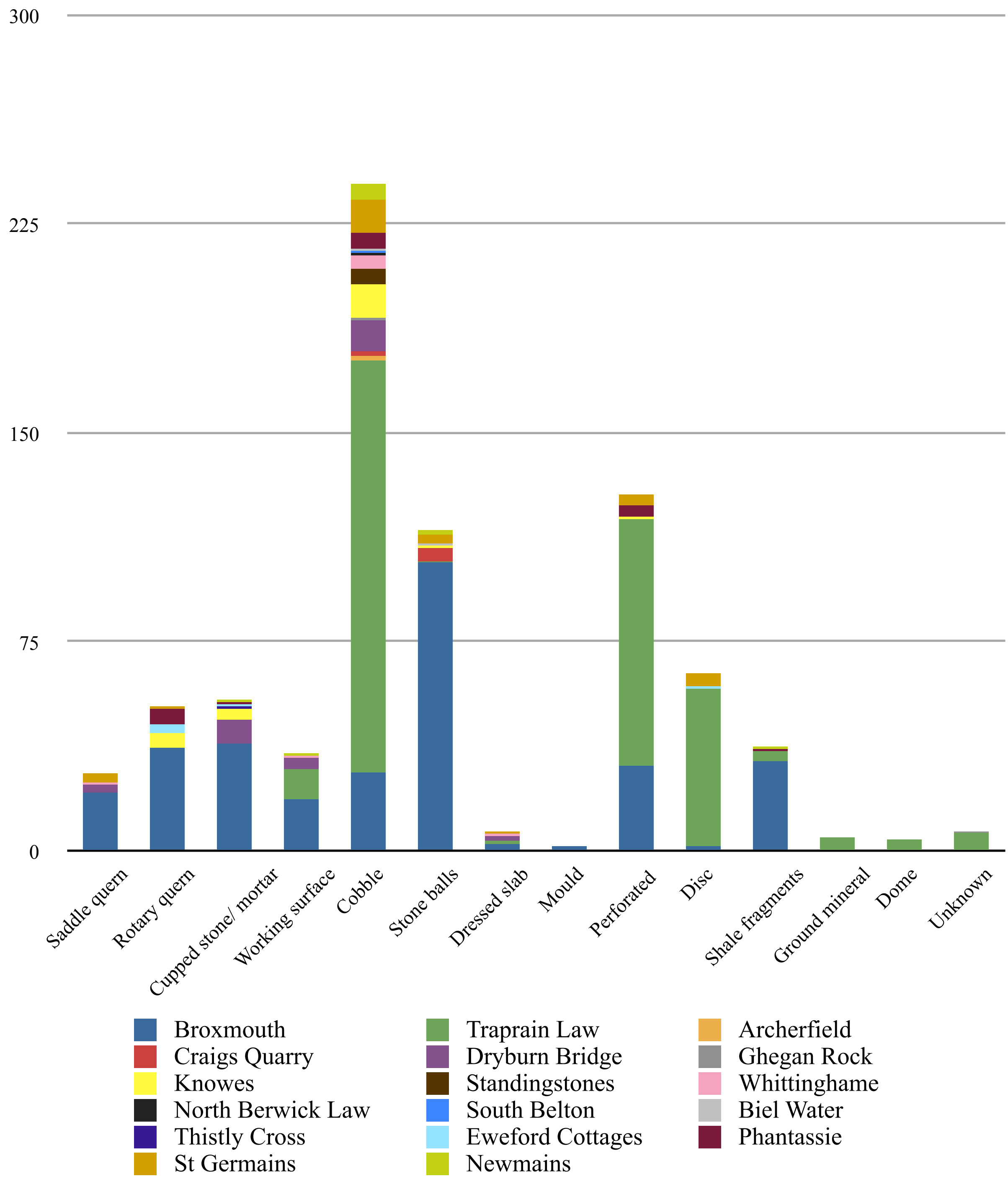



**Table 7:** This table includes all the objects examined first hand (Appendices 1 and 2), arranged by basic finds type. Cobbles are the most common object and can be found at most sites. Broxmouth has an unusually high number of stone balls, while ground minerals and domes are restricted to Traprain Law. However, Traprain Law has the largest assemblage meaning that the presence of a wider range of types is perhaps not surprising. Shale working is found at Broxmouth and Traprain Law with limited evidence at Phantassie and Newmains.

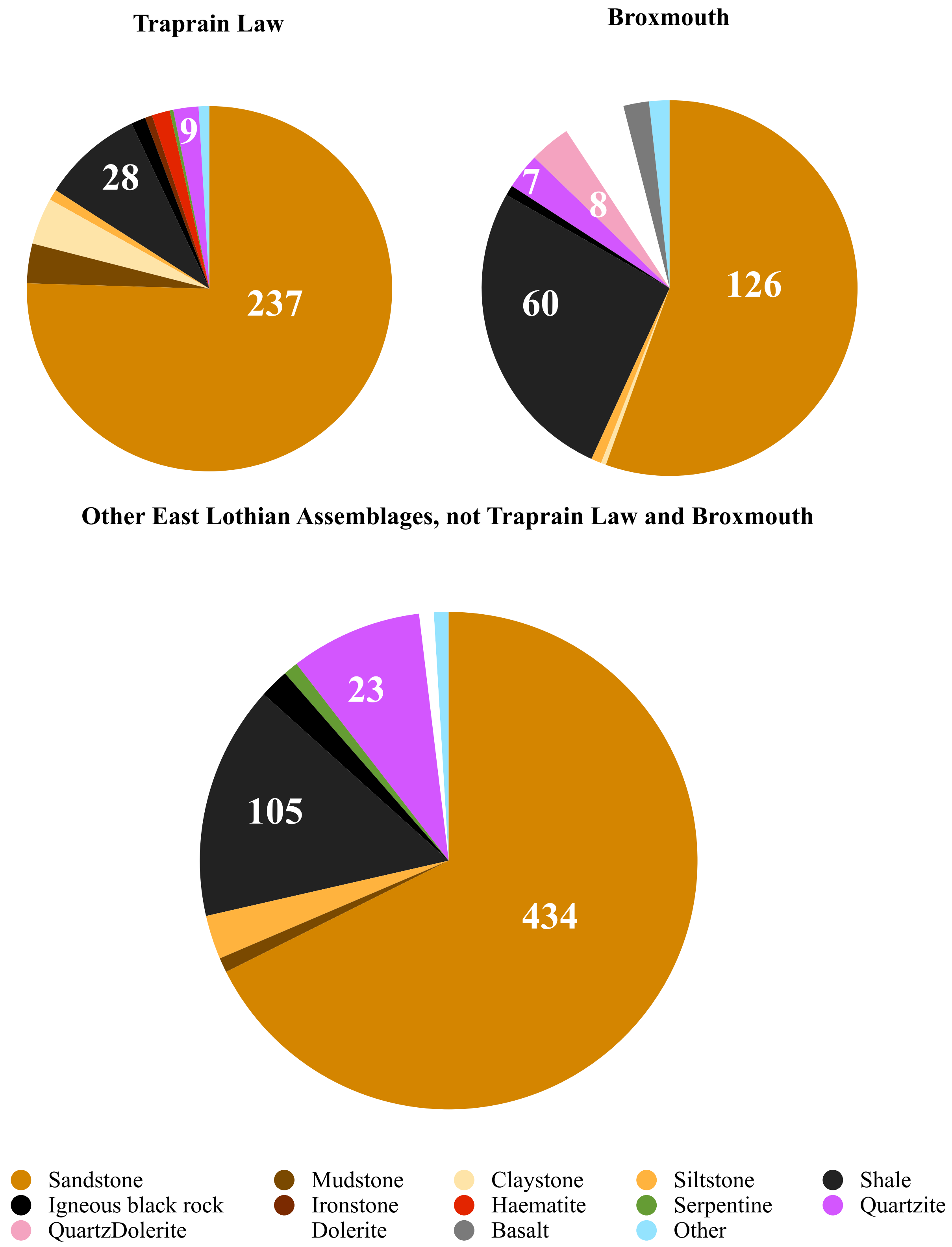
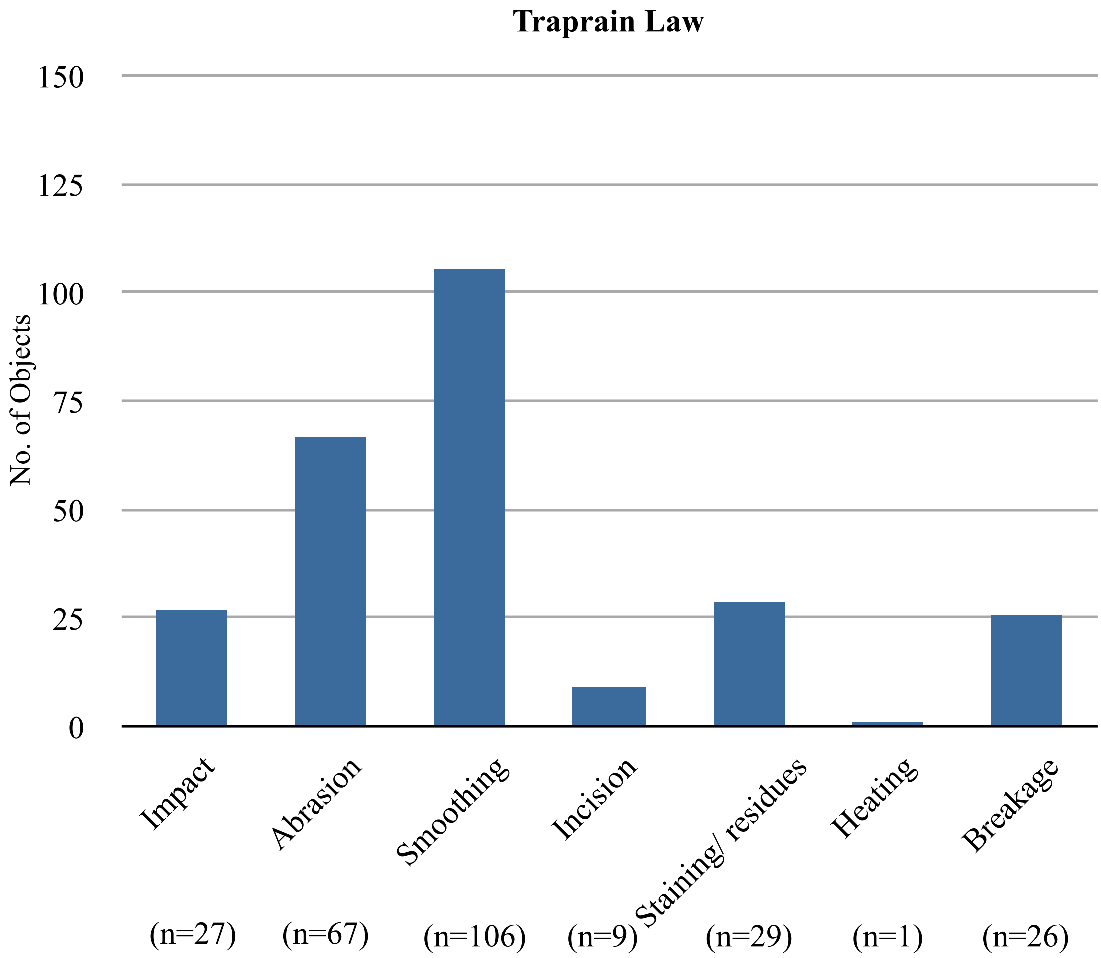
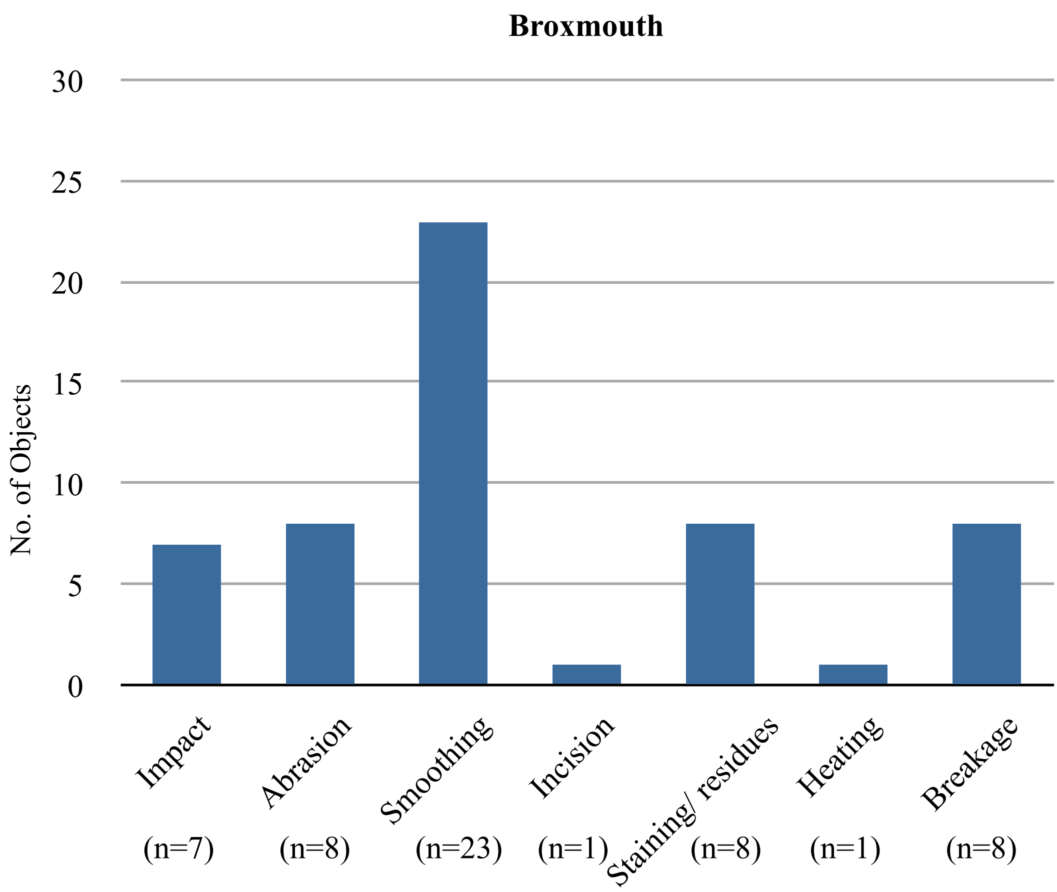



**Table 8**: Pie charts showing the number of Iron Age objects made from each of the stone geologies present in East Lothian. Sandstone dominates the assemblages, then shale and quartzites.


Traprain Law
No. of Objects
150
125
100
75
50
25
0
Impact
Abrasion
Smoothing
Incision
Staining/ residues
Heating
Breakage
(n=27)
(n=67)
(n=106)
(n=9)
(n=29)
(n=1)
(n=26)


Broxmouth
No. of Objects
30
25
20
15
10
5
0
Impact
Abrasion
Smoothing
Incision
Staining/ residues
Heating
Breakage
(n=7)
(n=8)
(n=23)
(n=1)
(n=8)
(n=1)
(n=8)

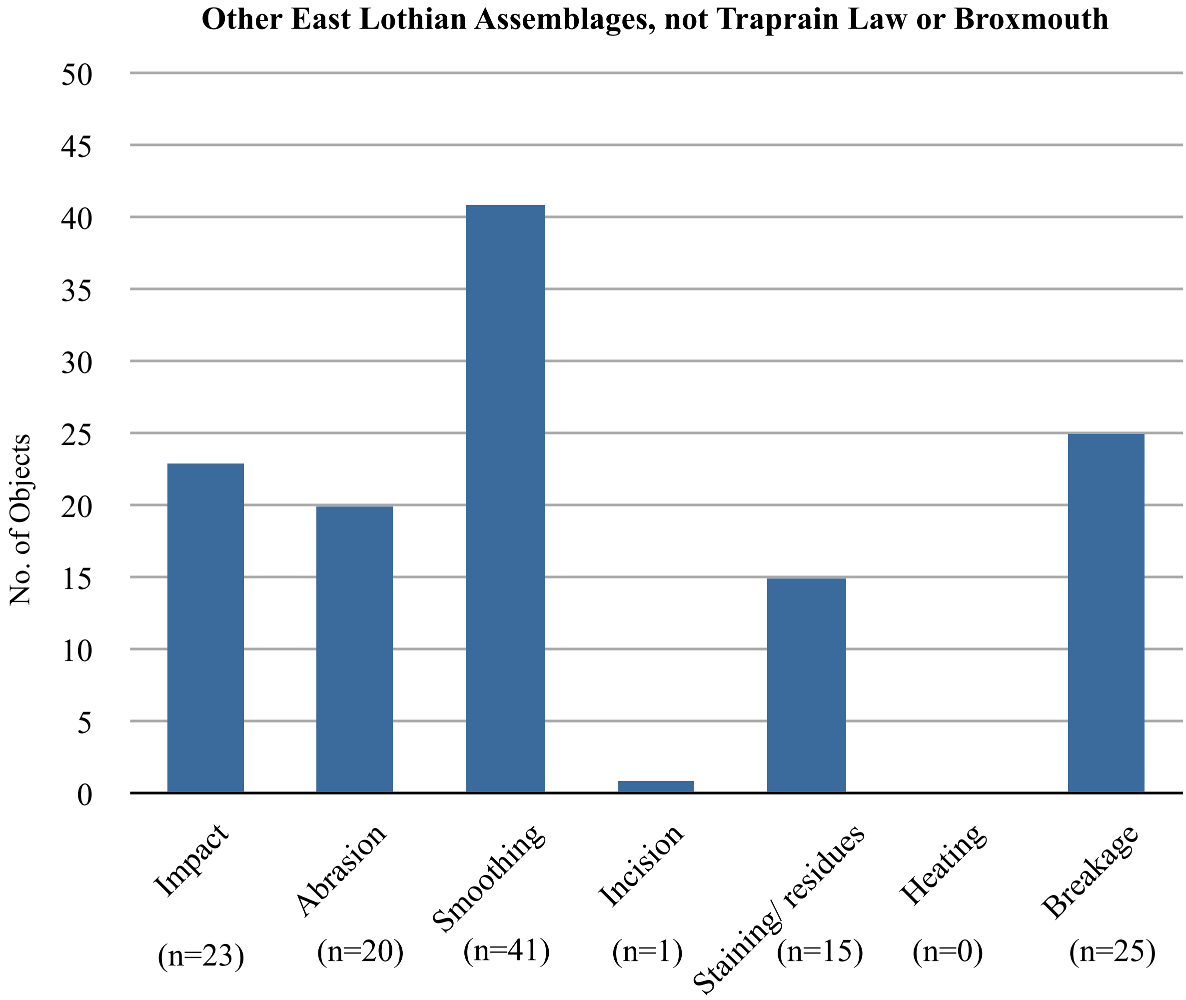



**Table 9:** Bar charts, this and previous page, showing the number of cobble tools with different types of wear from Traprain Law, Broxmouth and the other East Lothian Iron Age assemblages. From Traprain Law 124 cobbles were examined, but because many of the cobbles show more than one type of use-wear the total in the above chart comes to 265. From Broxmouth 32 cobbles were examined, but the total in the above chart comes to 56 for the same reason. From the other East Lothian assemblages use-wear data was available from first hand examination or from publications except for Phantassie and Biel Water. The total number of cobbles included in the above table for the other East Lothian assemblages is 57, but again the total in the chart is much higher at 125, demonstrating the layering of use-wear. Staining or residue is associated with use as a hone or smoothing activity except in exceptional cases were pigment was detected. Otherwise the pattern of overlap between types of use wear is variable so cannot be meaningfully quantified.

Overall, it is clear that cobbles were adaptable and had long use lives. The types of use wear represented between Traprain Law and Broxmouth (and also to the group of other East Lothian assemblages) are strikingly similar.

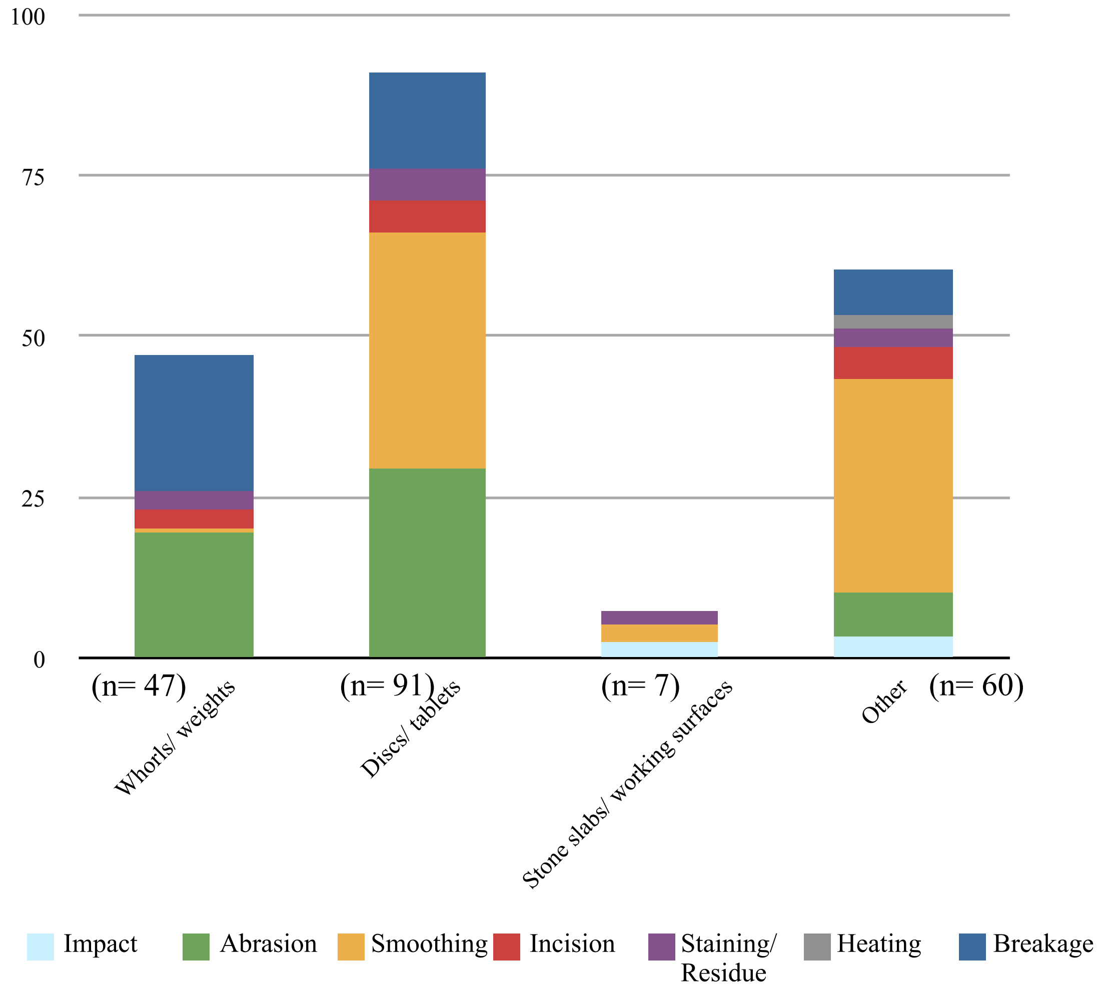



**Table 10:** Bar chart showing the types of wear found on whorls/ weights, discs/ tablets, stone slabs and other objects from East Lothian, including Traprain Law and Broxmouth. This chart does not include cobble tools, querns (saddle or rotary), cupped stones or mortars. The most common types of wear are abrasion, smoothing and breakage (comparable to the cobble tools). These objects are adaptable, showing another episode of re-use, though not layered wear like the cobble tools. These objects probably had long biographies.

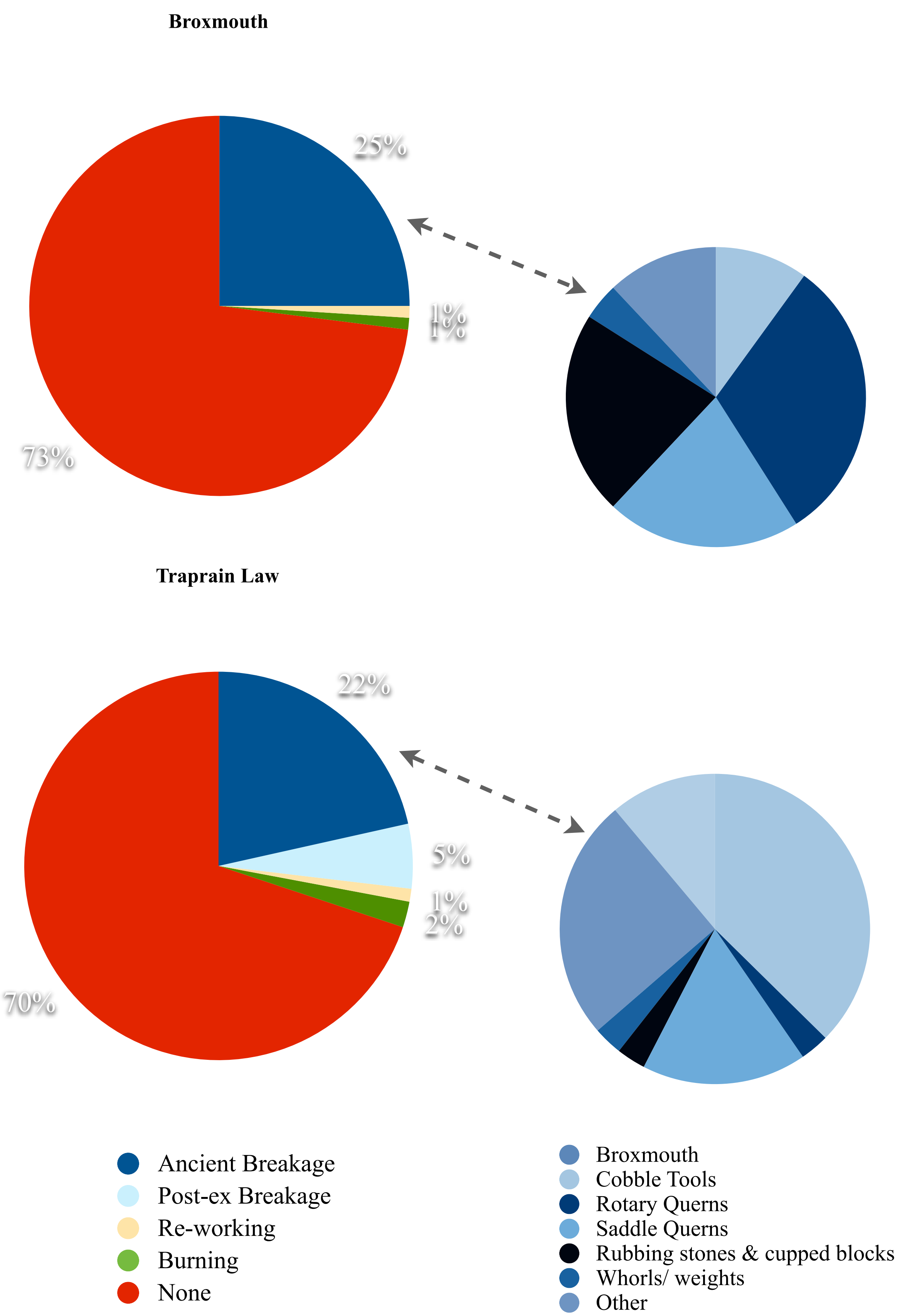



**Table 11:** Pie charts showing the % of breakage, re-working and burning of all the objects examined first hand or published in site reports, and the % of the types of objects from Broxmouth and Traprain Law which have ancient breaks (pie charts in blue). Post-ex breakage was distinguished from ancient breakage by examining the relative wear of fractured edges; new breaks are fresh and brighter in colour, while old breaks are weathered with rounded edges and surface colour weathered as the rest of the object surface. Re-working refers to repair and re-design of objects and was only definitely detected for four objects each from Traprain Law and Broxmouth. Burning refers to evidence for charring, discolouration through heat and firecracking and is only found on 1% of objects.

# Chapter 6 Late Prehistoric and Roman Pottery

The plastic, transformative and shattering affordances of clay and pottery in the Iron Age of East Lothian are to be examined in this chapter. Primarily, late prehistoric pottery assemblages from East Lothian will be re-examined (not including structural or artefactual ceramics) to propose that pottery played a central role in Iron Age cosmologies. Iron Age pottery is most frequently found abraded in midden deposits which will have been used as fertilizer. The minerals included within the pottery fabric will have been a good addition. Firing temperatures below 900°C were used to make late prehistoric pottery in Britain, making it an unstable material since this temperature is not high enough to fully transform the clay minerals into a crystalized ceramic (Gibson and Woods 1997: 27). This means that many of the sherds are not recovered in excavation since they transform back into their original clay state when buried in the ground (ibid.). Nonporous and durable ceramics were not available until the Late Iron Age. Even with the appropriation of ceramics which are better at surviving naturally, pots and vessels are not found as complete; for example at Knowes, East Lothian, a Roman flagon was smashed, argued to be part of a feasting event marking the abandonment of a building (Haselgrove et al 2009: 89, Hunter 2009: 140).

## 6.1. From stylish to substance

Southern British Iron Age studies have focused on typologies, production, exchange and function of pottery, rather than the haptic and emotional ways in which people engaged with pots. The presence and absence of particular typologies of pottery have been employed to define geographies of culture-groups and their economies and influence

(Cunliffe 1978, Peacock 1969, Childe 1952: 203-263). On the other hand, Iron Age pottery in Northern Britain was until recently thought to be of little cultural and chronological value (Childe 1935: 223, 242-243, Cool 1982: 92). In general, the materiality of clay and pottery through detailed consideration of potsherds' affordances and biographies have had limited consideration across the whole of the British Iron Age, meaning that pottery has been decontextualised from their everyday contexts of making, use and deposition.

In the southern British Iron Age, pottery types such as 'Glastonbury' ware (exemplified by Peacock 1969) and Cunliffe's definitions of wares including 'Durotrigian' and 'Atrebatic' pottery groups (Cunliffe 1978: 97–100) provided the impetus towards traditional pottery studies. Cunliffe's definition of style zones were based upon the characterisation of pottery types defined by diagnostic stylistic traits and the area within which these types were in common use from a central production zone (Cunliffe 1978: 31-57). However, style zones ignore the existence of composite site assemblages and the evidence for interaction, as criticised by Collis (1977) who called for a ground up regional approach. This harks back to Hodson (1964) who previously argued that explicitly regional curations of assemblages reflecting local practices should be recognised in the archaeological record. More recently a high-order approach has given way to functional studies, including those carried out by Cool (1982), Woodward (1997), Morris (1994, 2002), Hill (2002) and Pope (2003), where regional production is of prime concern.

In the southern Scottish Iron Age, Cool (1982) on examining the pottery from Broxmouth and related local assemblages, unlocked the potential of what was previously ‘dismissed as being of little cultural or chronological significance’ (Cool 1982: 92). According to Cool, Type I and Type II forms were discerned; Type I being of very poor quality, roughly made, not very well fired and with thick walls. Type II was of better quality, with thinner walls, finer fabric and fired in a more controlled manner (ibid.). Re-analysis of the Broxmouth pottery by MacSween supports the difference in morphology between Type 1 to Type 2, based predominantly on the change from coarser and more heavily tempered fabric to finer less frequently tempered fabric, in the Broxmouth assemblage but its chronological significance is now cast into doubt (Tables 14 and 15, Section 6.3.1). Nevertheless, potentially a rough chronology is attainable if we look beyond Broxmouth, for which there is ample evidence from other East Lothian Iron Age assemblages. However, beyond pottery being simply useful for dating evidence, what is perhaps more interesting are the motivations behind this change and the subtle variations between sites.

Woodward’s (1997) call for more research upon vessel size and function, and thus the functional or symbolic preferences dictating pottery form, moves away from delimited cultural groupings and pottery as simple chronological indicators. More recently Humphrey stated ‘we have begun to realise that the most interesting questions relating to Iron Age material culture concern the choices (of materials, form and style), which Iron Age peoples made about their possessions and lifestyles. In addressing these choices, we can come closer to an understanding of the things that made the Iron Age communities different, as well as the things they shared,’ (Humphrey 2003: xiii). These concerns have been mirrored in the work of Morris who suggests that ‘prehistoric potters made their wares for specific purposes within a social web, and prehistoric people used them in a variety of ways to solve social problems’ (Morris 2002: 54).

Nevertheless, it remains that these analyses are visibly and functionally one dimensional; there is little consideration of the life biographies of ceramics except for descriptive accounts of technology (Woodward 1997), production and exchange (Morris 1994, Peacock 1969).

The presumption by archaeologists who study Iron Age material culture that design was intentional and determined how a pot was to be used, is also a problem. For example, prescribed pottery function by design is exemplified in Hill's (2002) study. Hill examined stages in pottery manufacture and function in addition to 'styles of deposition' and argues that changes in the ways in which food and drink were prepared and consumed in the pre-Roman Iron Age created the demand for the acquisition and creation of new pottery forms (ibid.:158). This is a step closer towards understanding the biographies of pottery enacting social relationships (Hill 2002: 158). However, it is stated that "new tall forms were probably vessels *designed* for drinking alcohol" (Hill 2002: 147, my emphasis). Therefore, it is lacking in a critical consideration of actual exploited affordances. It is equally possible that the introduction of new forms of pottery may have afforded changes in consumption practices, or that new forms were acquired or created for other reasons not related to ideas of function but rather related to a change in access to resources and networks of engagement required for making pottery.

In this chapter it becomes clear that the introduction of new pottery designs in East Lothian did not prescribe change in practices of consumption or deposition. In addition the differential use of samian ware on Roman and native sites in Scotland illustrates perhaps what might be considered unexpected affordances of pottery exploited by Iron

Age people. On Scottish native sites including Phantassie, East Lothian (Lelong and MacGregor 2008) and Traprain Law (Erdrich et al. 2000), by contrast to ‘Roman’ sites, samian is often found as small fragmented pieces with areas of grinding, chipping or abrasion; it has been suggested that this is evidence for the use of samian as a source for pigment (Hunter 2001: 301, Hunter 2007: 37).

Bradley (2002) describes pottery as ‘human clay’ and writes of its “powerful metaphorical role in many societies…the processes of potting are fundamental to human understanding of the world” (Bradley 2002: foreword). Once clay is taken out of the ground it is in transit from that moment; properties and meaning constantly in flux (Pollard 2004: 47). The stages in making pottery involve changing materials which are continually in process (clay-body-pottery-clay), and this was demonstrably valued in Iron Age East Lothian.

The Iron Age coarse pottery and occasional Roman ceramic sherds from East Lothian will be studied following a biographical structure, to examine the appropriation of materials and its manufacture, use and deposition, and their perceived and exploited affordances.

### 6.1.1 Data Collection

The late prehistoric pottery and Roman ceramics from three sites were examined first hand; Broxmouth, Traprain Law (late prehistoric pottery from the recent excavations (MacSween unpub., MacSween unpub. 2009, Armit and Hunter 2006) and the Roman pottery from Curle and Cree’s excavations, and Roman and late prehistoric pottery from the unpublished site of Newmains (Appendix 2). These assemblages also formed part of a project of residue analysis carried out by the author in collaboration with Professor Carl Heron and the Broxmouth Hillfort Project, funded by the Society of Antiquaries of Scotland (the final report is attached). Gass-Chromatography Mass-spectroscopy of absorbed residues on Type 1 and Type 2 pottery from these three sites was employed to determine if there is a functionally sensitive typology of coarse native pottery from the Iron Age of south east Scotland, by examining the relationships between fabric, form and use (Section 6.4.1).

### 6.1.2 The East Lothian pottery assemblages

*Late Prehistoric Pottery*

Late prehistoric pottery is found at 75% of excavated Iron Age sites in East Lothian (Figure 54, Appendix 7). The Early to Middle Iron Age of East Lothian has been argued to be aceramic (Gwilt 2000: 137). However, very few sites in East Lothian produce early Iron Age radiocarbon dates and so this could be representative of a lack of Early Iron Age settlement in the area. Pottery is in fact found from Phase 3 at Broxmouth, though interestingly Phase 4 is aceramic. The majority of pottery is found in Phases 5/6 and 6. However, in this case the absence of pottery in Phase 4 is actually due to a lack of excavated midden deposits from this phase and is characteristic of the clean primary occupational contexts which were excavated (Section 6.5). Additionally, the absence of pottery in Phase 2 can be explained as taphonomic. There are no clear episodes of human activity from the East and West entrance areas excavated in this Early Hillfort Phase, and these entrances and ditches were heavily truncated by later activity.

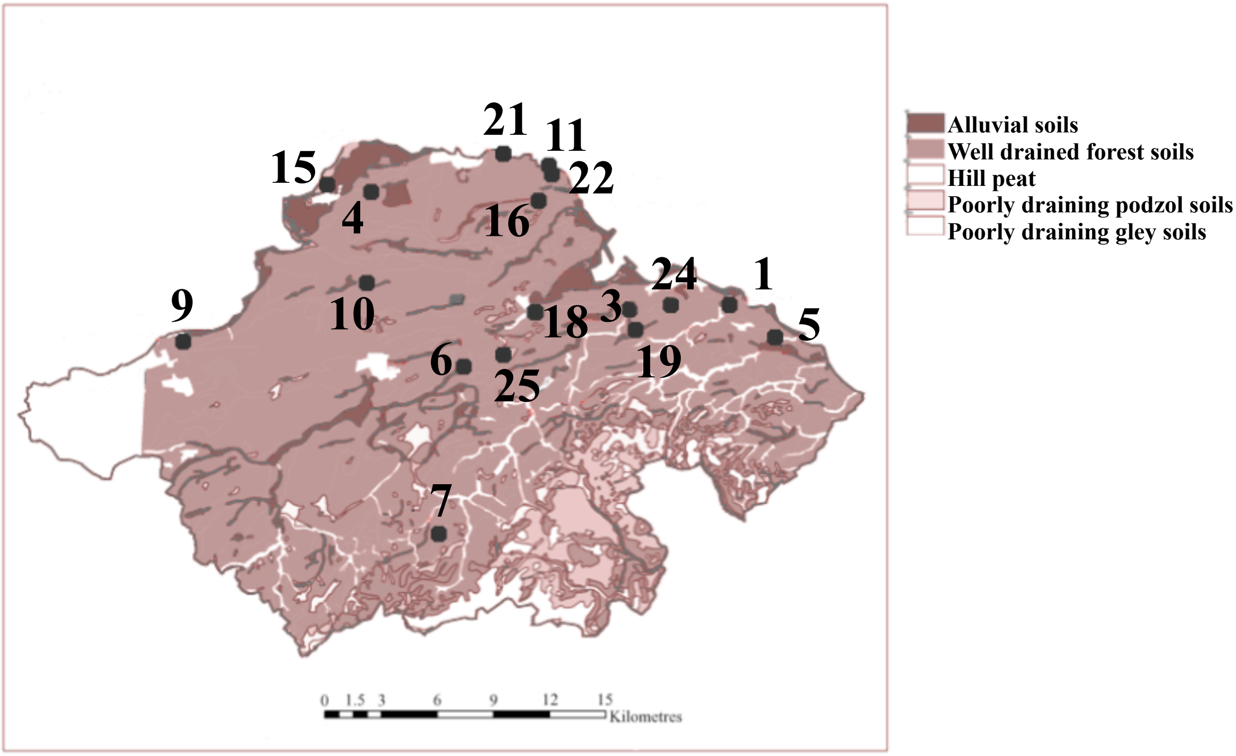



**Fig.54:** The excavated sites in East Lothian (see Figure 1) with Late Prehistoric Pottery in their assemblages. (Map: R Reader and M Maxwell)

Nevertheless, it is surprising that no pottery, except for two possibly intrusive sherds (GAS and GAT), was found in Phase 1 associated with Structure A, since evidence for metalworking (including artefactual ceramics) was found in this primary phase at Broxmouth, perhaps suggesting that pottery was a Middle Iron Age introduction. Pottery dating to possibly as early as the 4th century BC (although the error range for these dates span a couple of centuries) were found at Phantassie, Fishers Road West and Fishers Road East. However, whether the absence is real or a reflection of the type of contexts being excavated is difficult to ascertain since contexts in which pottery is directly found are rarely dated.

Broxmouth has a large assemblage of over 500 sherds which includes a minimum of 28 groups belonging to vessels (Table 12). The largest assemblage of late prehistoric pottery from East Lothian is, however, from Traprain Law (over 1000 sherds from recent excavations) (Armit et al 1999, Armit et al unpub., Armit et al unpub., Hunter

2001: 36, Hunter 2005, Hunter 2006b: 61-62, MacSween unpub., Rees and Hunter 2000: 425). The number of refitting sherds from Traprain is substantial showing that preservation is good and that whole pots were deposited on site; from the 1996-7 excavations there are 136 sherds from at least 24 vessels (Rees and Hunter 2000: 419-425) and from the 2006 excavations 108 sherds belong to 57 vessels (MacSween unpub. 2009).

As was the case for the worked bone and antler assemblages (Chapter 4), it is perhaps not surprising that the greatest quantity of pottery is from the same two sites of Traprain Law and Broxmouth. These are both sites with unusual circumstances of preservation situated on unusual geologies rising out from the East Lothian plain. However, the proportion of refitting sherds found at Broxmouth is much lower than at Traprain Law. Acidic soils characterise the East Lothian plain; not a good preserver of low fired pottery. Indeed, in general there are poor recovery rates from lowland cropmark sites in comparison to the larger assemblages preserved from upland sites (Alexander and Watkins 1998: 227 and Appendix 7). Despite the large scale excavation of Fisher's Road West and East only 14 sherds of pottery were recovered (Cowie 2000: 30-33, Gwilt 2000: 133-135). Two exceptions are St Germains and Newmains which were both open-area excavated crop-mark sites; their low-lying positions on the East Lothian fertile plain did not adversely affect the preservation of pottery. Therefore, the quantity of pottery found may be as much to do with pottery use-lives and styles of deposition as well as soil conditions.

Unfortunately a proportion of the St Germains assemblage was stolen from the site hut before cataloguing and examination (Alexander and Watkins 1998: 224-225). Similarly the size and importance of the assemblage from Dryburn Bridge cannot be qualified as the material is now lost (Cool 2007: 74, Dunwell 2007: 4).

*Roman pottery*

In addition six fragments of samian were found at Broxmouth: three as part of a hoard in House 1 (Figure 71), the other three found in different contexts in the Phase 6 Interior. The contexts in which samian is found are most often secondary and curated, discussed in detail in this chapter (Section 6.5). The samian sherds from Broxmouth span the Flavian and Antonine periods (Greene and Cool in prep. 2013).

At Traprain Law, samian and coarse Roman pottery is relatively abundant (Hunter 2006b: 61-62, Robertson 1970: 208), of which six are worn fragments and 12 were re-formed into whorls (and an additional Castor ware, black *terra sigillata*, whorl) and 15 into small discs. Newmains (unpublished) has 10 sherds of Roman coarse ceramic and nine sherds of samian. Nine different types of samian are known from Traprain Law (Rees and Hunter 2000: 425) ranging in date from late 1st century through to 3rd century AD (Robertson 1970, table X), indicating the prolonged circulation of this material. Elsewhere, Roman samian and pottery fragments are found on 15 sites in East Lothian (an up-to-date list is given in Wallace 2008 and Appendix 7). Phantassie has a single samian sherd and smashed Roman flagon (Hunter 2009: 140, Wallace 2008) and Knowes has a single samian sherd and sherd from a Roman flagon (Willis 2009: 123). A lone Roman pottery sherd was found in the topsoil at Fisher’s Road West (Thomas 2000: 33). Roman amphora fragments were found at Whitekirk and Dirleton in East Lothian, and a buff-coloured coarse Roman rim sherd was found at St Germains.

Additionally there are another six samian fragments from St Germains, all of which are now lost (Alexander and Watkins 1998: 233). There is a noticeably high proportion of samian present in the assemblages versus Roman coarseware; this may be because samian was particularly valued and therefore curated, and had more uses including pigment preparation (Section 6.4.2).

## 6.2 Appropriation

*Late Prehistoric Pottery*

Resources needed for late prehistoric pottery manufacture were freely available; clay, rocks, grass or organic materials for temper, water for levigation (preparation of the clay to create a consistent texture and prevent air bubbles forming) and pebble tools for forming and smoothing surfaces (Chapter 4). On close analysis of the pottery fabrics it becomes evident that there are subtle variations in the resources appropriated across the East Lothian Iron Age, indicative of household or individual relations or potting preference. Tempers were gathered locally from accessible sources perhaps controlled by generational ties or territorial rights.

The sandy clays of buff to orange-red colour used for making late prehistoric pottery in East Lothian were readily available. The dolerite, plagioclase, feldspar and quartz inclusions in the fabric of East Lothian pottery support local resourcing of clay and temper. This distinctive mineralogy is seen in the late Carboniferous dykes which cut through the geological strata at Cockenzie and Port Seton, East Lothian, and also found today as outcrops south of Wrecked Craigs (NT 405758) and Long Craigs at Seton

**Fig.55:** Looking north at White Sands, adjacent to Broxmouth. An exposed clay seam is clearly visible. The silhouette of North Berwick Law can be seen on the horizon. (photograph: M Maxwell)

Sands (NT 413764 - 437767) (Gwilt 2000: 135). More Carboniferous outcrops may have been exposed during the Iron Age. The presence of quartz grains, quartzite and alkali feldspar also indicate a coastal or riverine source for the clay (Gwilt 2000: 135). A substantial clay seam had been eroded and exposed during the author's visit to the White Sands beach adjacent to the site of Broxmouth Hillfort (only 200 meters away from the Hillfort's Eastern entrance) in May 2011 (Figure 55). Erosion of clay seams on the coast will have occurred in the Iron Age too, providing a readily available resource which may also explain the presence of some weathered inclusions in the fabrics. From my own visual inspection the gritty inclusions present in the Newmains, Traprain Law and Broxmouth pottery are often weathered.

The inclusions of small angular dolerite fragments and plagioclase/ alkali feldspar/ quartz intergrowths in one sherd from Fishers Road East (vessel No. 2) confirms the use of freshly crushed rock as temper probably close to the source (Gwilt 2000: 134), as it shows that no filtering of the crushed rock fragments took place before inclusion in the fabric. Thin-section analysis of the pottery from Fishers Road East identified dolerite inclusions in the fabric (Gwilt 2000: 133-135). One vessel from Fishers Road East has an unusually iron rich fabric signature suggesting the exploitation of a particular clay source perhaps not much frequented (ibid.:135). The inclusion of dolerite in the pottery fabric from Fishers Road West has also been noted, and similar fabric descriptions are given for the late prehistoric pottery from St Germains (ibid.: 136, Alexander and Watkins 1998: 224-233). The majority of pottery from Traprain Law has weathered igneous inclusions all of which can be found in exposed outcrops of rock on the Law itself (Rees and Hunter 2000: 419-420). While the temper was locally available, clay was imported into Traprain to line the base of the pond on the summit of the Law (Cree 1923: 221, Rees and Hunter 2000: 420) and excavations on the western summit found lumps of clay which had probably been collected for pottery manufacture (Curle 1915: 247, Rees and Hunter 2000: 420).

Unfortunately petrologies of the coarse rock inclusions from the other East Lothian late prehistoric pottery assemblages are not recorded, and even their colour and size are infrequently recorded. Despite this there is evidence that some communities chose different sources and combinations of rocks for temper, or if some inclusions are natural intrusions the differences in temper may indicate that communities collected clays from different sources. A mixture of angular and round rock inclusions are noted in the fabrics of sherds dating to the Late Iron Age from Knowes whereas only angular rock fragments are used as temper in pottery from the Late Iron Age at Foster Law (Haselgrove and Hale 2009: 108, MacSween 2009: 118-121). The black, white and red/ mauve micacious/ crystalline grit inclusions of varying size and shape in the fabric of the Newmains late prehistoric pottery assemblage are markedly similar to the gritty tempers found in both the Type 1 and Type 2 pottery from Broxmouth (Cool 1982) and in some sherds from Dryburn Bridge (Cool 2007: 74-75). This may mean that the same outcrops and clay sources were exploited by these latter three communities.

Grass or organic grassy matter, possibly animal dung, was sometimes used as a temper often combined with rock inclusions; for example in both the Type 1 and Type 2 pottery from Broxmouth, in the sherds from Newmains and St Germains (Alexander and Watkins 1998: 233). Interestingly, at Traprain Law grass or organic temper is only present in a very small number of sherds which have no other inclusions (Rees and Hunter 2000: 419). Dung and ash were valuable resources to the household and were at the centre of communal productive activities of farming and cooking, and may also have been used as a fuel in metal smelting (Chapter 7). As discussed in Chapter 1 in Iron Age East Lothian there is evidence that midden, which often included ash and no doubt dung and other smelly deposits suitable for manure or fuel, was curated and moved around sites and used as transitional deposits in between phases of occupation (Armit and MacKenzie in prep. 2013, Lelong and MacGregor 2008: 264-266). The use of dung as a temper in pottery would have produced a pungent smoke when burnt (Lelong and MacGregor: 49, Sillar 2000: 49) and will have signalled the productivity of the household. No organic temper is recorded in the fabric of vessels from Eweford or Phantassie, but grog (ground down pottery) was possibly used as a temper in one vessel (number 4) from Phantassie (MacSween 2008a).

### 6.2 Perceived affordances

#### 6.2.1 Pragmatic

*Type 1 and Type 2 Late Prehistoric Pottery*

Cool’s 1982 typology of late prehistoric pottery based on the Broxmouth assemblage has been influential for characterising the pottery of the south-east Scottish Iron Age. Table 13 shows the number of vessels assigned to type for each phase. The following descriptions of Type 1 and Type 2 pottery are from the Broxmouth Hillfort archive and Cool's 1982 paper on the finds from Broxmouth. Type 1 is distinguished from Type 2 by its coarser and thicker walls (Figure 56), however, it is also clear that Type 1 and Type 2 share numerous characteristics.


**Fig.56**: *Left* Type 1 sherd (FLQ) with large grit inclusion from Phase 6 at Broxmouth. The sherd with large grit inclusion also has a linear impression along its length, perhaps an impressed blade of grass. *Right* Type 2 sherd (DTH) made of finer fabric from Phase 5 at Broxmouth. (photographs: M Maxwell)

| Type 1 | Shared characteristics | Type 2 |
|---|---|---|
| | Bucket shaped with flat base | Can also be barrel shaped with flat base |
| Straight or inturned | Flat or rounded rims | Gently incurved |
| Very coarse and heavily gritted fabric | | Finer sandy fabric |
| Large black grits (may be >1cm in length) | | Smaller (<0.3cm) long with isolated larger grits scattered throughout |
| Thick walls | | Thinner walls |
| | Coil built (more evident on Type 1) | |
| | Unevenly smoothed | |
| | Fired with reduced grey cores and oxidised buff/grey to orange exterior surfaces. | |
| | Thin black layer over exterior surfaces (more common on type 2) | |
| | Intermittent use of grass [organic] temper. | |

Type 1 and Type 2 are distinguished mainly by their fabric: Type 1 is coarser and with more uneven surfaces, while Type 2 is finer with smoothed down surfaces. Otherwise, both forms vary in thickness and rim type, and both Type 1 and Type 2 used the coil building technique. Firing can in both cases be patchy and variable and both vessel types were made using the same resources. Additionally variation between forms (rims, thicknesses and shape) increases when comparisons are then made to other East Lothian late prehistoric pottery assemblages.

Type 1 and Type 2 pottery are found in other late prehistoric pottery assemblages across south-east Scotland. The presence of seven Type 2 sherds in the Dryburn Bridge assemblage is noted (the site occupied from the Early Iron Age to Late Iron Age) (Cool 2007: 74-75). Variations of Type 1 (thinner and better made than those from Broxmouth) and Type 2 (with moderately frequent inclusions of large sizes) are present in the Fishers Road East assemblage (Gwilt 2000: 136). In fact, because fabric is the constant distinguisher, the Type 2 vessel from Fishers Road East should be probably considered a Type 1. This example illustrates the confusion surrounding the typology. Additionally, the problem remains that very few sherds are from securely dated contexts. Nevertheless, a spatial and perhaps temporal distinction in the deposition of coarse and fine fabric vessels was noted at Eweford Cottages (MacSween 2008); coarse fabric sherds from six bucket-shaped vessels were found in fills of Ditch B and its terminal, whereas finer fabric sherds were found from three vessels in upper levels of Ditch Terminal A (Innes 2008: 136). However, Ditch Terminals A and B were in use contemporaneously and the ditches were infilled with very similar types of deposits over a short period of time determined by the lack of silting between contexts (ibid.). Three radiocarbon dates from two midden deposits in Ditch A all gave the same range of 350-40 cal BC (SUERC-8177, SUERC-8187 and SUERC-8176) (ibid.) meaning that the only viable distinction is spatial.

At Broxmouth there is a shift in predominance from Type 1 to Type 2 in Phases 5 and 6 (Tables 13 and 14), but importantly Type 1 never completely disappears and is still present in later phases into the 1st and 2nd centuries AD at Broxmouth contemporary with Type 2. Rather than being a chronological indicator this transition may reflect the type of contexts in which they are found (Table 14). The majority of sherds in Phase 3 are from the tightly dated infilling episode of the ditches at the South West Entrance (dated to 490 - 200 cal BC, SUERC 36093 and SUERC 36097 to 36102). The infill deposits are unusual in character, argued to be from a series of feasting performances (Chapter 1). Therefore the predominance of Type 1 sherds in these deposits may rather be a product of unusual activity in this area perhaps during possible feasting performances. Furthermore, only three sherds (two Type 2 and one Type 1) were found from primary contexts stratigraphically earlier than the secondary midden contexts deposited over this area meaning that we cannot ascertain which type was most likely predominantly in use during this phase. It is also interesting to note that according to the sherds recovered at Phantassie this earlier predominance of Type 1 is reversed (MacSween 2008a); coarser Type 1 sherds are more frequent in later phases (though we must be cautious in interpreting this data because of the small number of sherds recovered from Phases 1 and 2 at this site).

It is clear that without the dating of primary contexts in which diagnostic pottery is found in the houses or of the burnt residues on the sherds themselves, the current evidence does not detect a clear-cut chronological transition from Type 1 to Type 2 in the south-east Scottish Iron Age. Alternatively, we must consider functional and social reasons for the regional traditions of Type 1 and Type 2 pottery.

*Tempered for use*

The clays which were appropriated are relatively plastic but will have required in most cases the addition of dry temper to make them easier for working and to hold the structure of the clay pots (ibid.). Grass impressions within the fabric are found in both

Type 1 and Type 2 late prehistoric pottery from East Lothian. Dung may have been used as a temper and would have helped to equalise the moisture content of clay during heating and cooling. Dung is a particularly good insulator which maintains its structure during open firings, reducing the chances of pottery to shatter or 'blow' (Miller 1985: 46).

Type 1 pots are argued to be for storage (Cool 1982) based on their relative thicker and poorly constructed walls and larger more numerous inclusions in comparison to Type 2. This is also argued for the vessels at Fishers Road West (Cowie 2000: 30-33). Greater numbers of larger inclusions will have made the pots better at retaining water but will have increased the chance of pottery fracture during firing or cooking. Type 2 pots are conversely thought to be for cooking and everyday use (Cool 1982) as they are smaller in size and have a more even fabric with smaller to moderately sized inclusions which would better withstand cooking temperatures (Gibson and Woods 1997: 30, Hodges 1976: 25). The presence of sooting and encrustation on the Broxmouth Type 1 and Type 2 sherds, however, suggest that they were both used for cooking (discussed further below). Additionally, examples of both Type 1 and Type 2 pots have smoothed surfaces, which may indicate that either were used to store, prepare or cook liquid substances. The functional differences between Type 1 and Type 2 have further been cast into doubt by the project of residue analysis carried out on both types of pottery from Broxmouth, Traprain Law and Newmains (discussed below, Section 6.4.1).

### 6.2.2 Signative

*The agricultural cycle*

Organic temper was part of the agricultural cycle and embodied ideas of fertility. Dung would have been used as a fertilizer on fields and, if used for pottery, its collection will have been inter-related with animal husbandry practices. In Qaqachaka, Bolivia, dung is known as *jakaña*, which means placenta referring to how it wraps round the potato to nurture it (Sillar 2000: 52) expressing the dung's role in nurturing agricultural fertility. Comparatively, the word for dung in Andean society is *wanu*, which shares the same meanings as fertility (ibid.: 53). Grass impressions are frequently recorded impressed into the outer surfaces of Late Prehistoric pottery from the region (Figure 56), and seed impressions are recorded on a sherd from Newmains and from Broxmouth (CYU, Figure 57). The seed imprints may be signative of the food they held, as argued for Neolithic Unstan ware from Orkney (Jones 1999: 70). The barley seed impression, however, may have meant more than this, perhaps marking a transitional event in an individual's life including coming of age rites. In Bali the sowing, growing and harvesting of rice is thought to mirror the growth cycle of human beings (Howe 1991). Marriage, having children, becoming a priest and death are all legitimised by the Balinese through the rice cycle (ibid.: 455 and Chapter


**Fig.57:** A body sherd close to the rim from Broxmouth with a barley grain impression (Type 2, finds code CYU). The red notation on the pottery was done c.1978-82. (photograph: M Maxwell)

4 Section 4.3). Similarly, to Gell (1993) the cycle of plants is integral to how time is universally culturally conceptualised.

Potting was an activity linked to the agricultural cycle, but not necessarily dictated by the seasons. Howard (1981) argues that seed impressions in pottery fabric reference their manufacture after the harvest in the relative dryness of autumn. If this was the case, it is therefore assumed that clays and tempers were prepared in the late summer. According to some Peruvian beliefs clay is prohibited from being collected during the harvest season (Lèvi-Strauss 1996: 24). To explain this restriction Lèvi-Strauss (1996) opposes dry to wet; only those living in areas with poorer drier soils made pottery whereas people farmed in areas with well-watered soils. However, this binary interpretation is too simplistic, since it is unlikely that there was a conceptual distinction between agricultural activities and pottery manufacture given that Peruvian settlements in each area exchanged goods with each other (ibid.). In East Lothian, also, the majority of sites where located next to fertile alluvial soils, suggesting that there was not a conceptual division between agricultural and craft activities such as pottery. Indeed, for practical reasons Gibson and Woods (1997: 48) have questioned the reliance on the seasons since British Prehistoric pottery dries easily in all conditions due to its porosity and coarseness, and the clay will naturally re-absorb moisture from the atmosphere anyway. Additionally, seeds and clay may have been stored in the Iron Age of East Lothian and firing on a hearth inside a structure does not require good weather (ibid.: 57). The analysis presented so far in this thesis suggests that throughout the Iron Age in East Lothian, craft activities were nevertheless intwined with the agricultural cycle and site productivity. Gathering the resources for making pottery may have been regarded as another agricultural activity, linked to the productivity and fertility of the population.

*Identity and the household*

Technological properties were not always a factor for choosing the inclusions added to clay. At Traprain Law there is a clear differentiation between sherds with white inclusions and sherds with darker inclusions argued to be the result of 'conscious choices rather than accidental inclusions" (Rees and Hunter 2000: 420). Both are igneous inclusions, and therefore it is presumed that both share similar technological properties (ibid.). Thus, these inclusions were chosen for another reason, probably for their colour. The same could be argued for the re-occurrence of Type 1 and Type 2 pottery fabrics across East Lothian. Type 1 inclusions are predominantly darker greys and blacks, whereas Type 2 inclusions are a myriad of mauve, white, and grey. Nevertheless the rock inclusions are to a degree variable between sites (as discussed in Section 6.3.1). People adapted tradition to create their own interpretations of Type 1 and Type 2, using sources accessible to them according to generational and/or territorial rights. Local identity was visibly expressed by the inclusions breaking through the outer surfaces of pots which acted as symbolic signifiers of connections to specific places (Hamilton 2002, Woodward 2002: 109).

Furthermore, the productivity of the household may have been physically embodied in the manufacture of pottery, since grinding of pottery temper and inclusions could have taken place on the household quern. The use of a saddle quern is documented for grinding down schist applied as a coating to pottery from Dangwara, in the Malwa region of Central India (Miller 1985: 208-209, 226). There are 20 saddle querns in the Broxmouth assemblage. Additionally, the diameters of the feedholes on many of the rotary querns from Iron Age East Lothian were also big enough to allow the entry of rock fragments, and it is conceivable that the upper and lower stones could be adjusted to the appropriate height for grinding grits. Querns also used for grinding the staple grain were integral to the everyday cycle of life and agriculture (Fendin 2000).

*Transformation, heat and fertility*

Heat is the powerful transformative agent in pottery manufacture. Some of the same materials (water, clay (for moulds in metalworking) and even ceramics in the form of tuyères), and similar ways of making (pounding, bending and twisting) were involved in both metalworking and pottery manufacture. The relationship is reversed however; malleable clay is turned into solid pottery whereas metalworking turns solid ore to a liquid state through heat. This relationship between metal-working and pottery manufacture is argued to be important for how Bronze Age people conceptualised and organised their worlds for example at the Százhalombatta tell site in Hungary (Sofaer 2006) and also for the first peoples of the Americas (Lèvi-Strauss 1996: 10 and 18). Know-how was transferred between these material categories (Sofaer 2006). Both pottery and metal working embodied ideas of fertility and transformative power (Budd and Taylor 1995, Hingley 1997, Chapter 7). In Sub-Africa traditional pottery is almost unanimously regarded as a female craft, and is most frequently practiced by the wife of the smith (Herbert 1993: 203-206). Learning to make pots was perhaps an important part of an individual's coming of age, for example the female Shai potters from Ghana learnt their craft during puberty rites over a period of two or three years and Bamana females from Mali can only become potters after their excision (Herbert 1993: 207, 209). The latter excision ceremony involves making pots in a field and then cultivating a common field where a young twin girl sows the crop (ibid: 209), marking a link also to the agricultural cycle.

The generation of heat in the firing and creation of pottery can be likened to sexual intercourse (Tilley 1999: 58). It is because of this that pottery in many cultures is surrounded by taboos regarding menstruation, sex and pregnancy. In myths belonging to the first peoples of the Americas, the origins of clay were borne from a woman, known as 'Mother Earth', 'Grandmother of Clay' and 'Mistress of Clay' (Lèvi-Strauss 1996: 28). The origin of cooking fires in Guianan myths is from a woman who keeps it hidden in her vagina (ibid.: 44). The Tanimuka of southeastern Columbia and the Nyoro of Uganda do not allow pregnant or menstruating women near the pottery firing process or else the pottery will crack (ibid.: 26, Herbert 1993: 208). In Ede, Yoruba, only "bloodless" old women could make pottery used in ceremonies because of the danger of making such pots for younger fertile women (Herbert 1993: 215). For the same reason male potters of the Maranhão Urubu of south America do not eat, drink, urinate, have sexual intercourse during the firing process (ibid.). Men of the Shia, Ghana, are forbidden from coming near the potting pits since "it was believed that any man who tried would immediately lose his sexual potency" (Herbert 1993: 207).

Firing pottery is a risky process. Open pit firing has a 5-10% failure rate (Sillar 2000: 47) because if the clay is not worked well or left to dry out long enough prior to firing, trapped air bubbles will sometimes expand causing pots to explode. Therefore, firing clay could be both a creative and destructive process. Death is not often conceptualised as an oxymoron to birth, but rather is another biographical moment of transformation which too involves both the destruction and renewal of materials. In Iron Age Europe cremated bodies were often buried in vessels, some even in the form of faces complete with ear-rings, popular in Poland from 7th to 2nd century BC (Rebay-Salisbury 2010: 67-68). The role of pots in feeding the body in death was also enacted in a particular way at the cemetery of Vollmarshausen in Germany during the Early European Iron Age; despite their open orifices, holes were punched into the sides of pots to enable the passing of liquids and food to feed the cremated remains (ibid.:69). In this case, both pot and body had been fragmented to allow entry into the next world. The transformative power of clay was manipulated, embodied, fragmented and even bodily consumed. In Iron Age East Lothian the fragmentation of curated human remains (Chapter 4) and their deposition in a variety of midden, occupation and ditch entrance terminal deposits in which pottery fragments are often found is perhaps significant. At Knowes, East Lothian, a Roman flagon was smashed argued to be part of a feasting event marking the abandonment of a building (Hunter 2009: 140), and perhaps also to mark the death of an individual.

*Pottery as a bodily substance*

Kneading, pounding and baking pottery are the same gestures involved in cooking. Pottery, like food, may have also have been consumed as a basic necessity. A final reason for pottery's significance in everyday life is its supposed nutritional, medicinal and religious benefits through the bodily consumption of clay. This may explain why clay was primarily used for cooking vessels. Geophagy, or the eating of earth, is widely practiced across the world, including southern America, Mexico, Belize, Central America, the Middle East, India, China, Australia and across Africa (Lèvi-Strauss 1996: 175, Reilly and Henry 2001). It has been claimed that the mineral content of clay can detoxify tannins and make certain foods taste less bitter which may be why clay was first used to make pottery, allowing the consumption of a wider variety of resources (Browman and Gundersen 1993: 414, Rice 1999: 9). Earth and clay may also be a good source of nutrients and minerals. Clay acts as an anti-acid in the gut to treat diarrhoea as proven for primates (Krishnamani and Mahaney 1999), as exploited by modern day Nigerians (Vermeer and Ferrell 1985: 634-635), and is a good source of iron, as used in modern day Uganda (Abrahams 1997). Soils in Uganda were chosen for their distinctive smells and medicinal power, and although some contaminants harmful to people are present and there are no scientifically recognized curative powers, many do have beneficial amounts of iron and other minerals in them (ibid.: 617, Reilly and Henry 2001). Additionally, pots absorb fatty lipids and nutrients from food cooked in them which can then be consumed by eating the pottery sherds themselves; eating pottery sherds is documented for the Timucua, southern America during famine (ibid.) and also is mentioned in songs belonging to the Toro of Western Uganda (Childs 2000: 247). The Pomo from north America mix red clay into the dough of their bread (Lèvi-Strauss 1996: 175). Indeed, potters from the first peoples of Mexico tasted their prepared clay to check the texture before firing (Lèvi-Strauss 1996: 175). The incomplete firing of the south-eastern Iron Age pottery will have meant clay was included to an extent in people’s diets if used for cooking. Clay and pots consumed as food contributed to peoples’ health and wellbeing and indeed clay consumption is often practiced as part of belief systems. Across Central America and Nigeria, Africa, it is most often offered as a medicine to pregnant women providing nutrients and vitamins vital for a healthy fetus (Hunter and De Klein 1984, Vermeer and Ferrell 1985: 635). In Belize today clay tablets are produced at a Christian temple site with healing springs and are chewed or taken with liquid (Hunter and De Klein 1984);

> " Devotees believe that the tablets cure innumerable ailments like diseases of the stomach, heart, and eyes or menstruation difficulties, and especially that the tablets will assure easy pregnancy and childbirth". (ibid.: 159).

The Romans and Greeks used embossed *terra sigillata*/ samian discs in a similar way as the cakes from Belize. Samian from the Aegean island of Lemnos was used as an antidote to poison and as a cure for plagues and other illnesses, amongst them menstruation. Women also used these discs to aid childbirth. However, it is not known whether these discs were actually eaten. As discussed in Chapter 5 (Section 5.4.2), discs of haematite were perhaps similarly considered curative amulets. Both are red substances with a high iron content, so when ground down or interacted with heat they both will have smelt strongly and become in substance similar to blood. In Dungwaran society, fully oxidised pottery (oxidation turns the clay orange-red) took on a particular value, since red was a particularly sacred colour associated with weddings, religion and ceremony (Miller 1985: 142- 148). The colour applied to the village shrines in Dungwara is known as *sindhu*, and the application of this red *sindhu* colour on any mundane object, including natural pebbles, is enough to change it into an "object of veneration... from the secular to the sacred" (ibid.: 143). Red pots and items are therefore rarely found in Dungwaran houses (ibid.: 145). This dichotomy between the domestic and the ritual, however, is not likely to be as clear cut in everyday life. It may be no coincidence that a cranial fragment with evidence of sword blade incision is found associated with a fragment of samian in the rubble infill of the phase four in House 4 at Broxmouth. In this structured sealing deposit, the red samian fragment's ability to turn to blood referenced the vitality of life and perhaps violent end of this individual. The curative properties embodied in clay may provide the link between pottery and the fertile agricultural cycle, and may explain why pottery often ended up in midden, some of which was used to spread over fields to provide nutrients for growth.

### 6.3 Exploited affordances

#### 6.3.1 Morphology

*Form*

Type 1 and Type 2 are not proven to be useful chronological or functional categories (Sections 6.2.1 and 6.4.1). Furthermore, despite the acceptance of a typology of coarse and finer pottery fabrics (MacSween 2008, MacSween 2008a), originally put forward by Cool (1982), pottery forms vary between and even within sites. The residue analysis results from Newmains and Traprain Law (Section 6.4.1) do not prove a link between the type of rims, wall thickness or vessel shape to particular pottery cooking or storage functions.

Upright bucket shape vessels with flat bases are the most common form found across sites in East Lothian (Alexander and Watkins 1998: 225-226, Cool 1982, Cool 1997: 73, Innes 2008: 136, MacSween 2008, MacSween 2008a, MacSween 2009: 120). A preference for concave forms is seen at St Germains (Alexander and Watkins 1998: 228-231), whereas frequent occurrences of both bucket and concave/ globular forms are found at Broxmouth (e.g. CXG and EMQ), Fishers Road East (Gwilt 2000: 134) and

Knowes (MacSween 2009: 119). Colour and thickness vary widely between sherds found at Traprain Law and other sites across East Lothian. Despite the fact that 87% of Traprain Law's sherds are remarkably similar in fabric with <5 to 10% igneous rock inclusions (MacSween unpub., MacSween unpub. 2009, Rees and Hunter 2000: 420-421), this is the site with the highest variation in morphology within its late prehistoric pottery assemblage. Uniquely at Traprain Law some of the outer surfaces of the thinner vessels are slipped (MacSween unpub.), a trait not found elsewhere on late prehistoric pottery from East Lothian except on one sherd from Dryburn Bridge (Cool 2007: 74). Across the East Lothian late prehistoric pottery assemblages a range of rim forms are present; from flattened or rounded plain upright rims to bevelled in-turned or out-turned rims.

*Decoration and skeuomorphs*

There are very few examples of decorated pottery sherds from Iron Age East Lothian; two sherds from Broxmouth, two sherds from Thistly Cross, a sherd from Eweford and four vessels from Phantassie. Decoration was in the form of impressed or incised grooves, dots and lines in simple arrangements. One sherd from Broxmouth has three circular impressions arranged in a triangle made with a rounded implement on its outer surface (BDU, an unstratified Type 1 sherd from House 1) (Figure 58) and another two sherds have longitudinal impressions just under the rim, perhaps from blades of grass (FLQ, a Type 1 sherd from House 1 in Phase 6 (Figure 56) and EMQ, another Type 1 sherd found in the Phase 5 midden deposit dumped over the previous phase of occupation in the Inner Ditch). One of the decorated sherds from Thistly Cross, probably of Iron Age date, has a 'slight finger-tip groove' beneath the bevelled rim

(Innes 2008: 131, MacSween 2006), while the other sherd has a series of dots around the lip and groove below its rim (Innes 2008: 136). Both sherds have coarse fabric and are from bucket-shaped vessels and are probably Type 1. Another Type 1 vessel from Eweford was decorated in a similar way (MacSween 2008). Decoration is noted on four pots, all Type 1, from Phantassie in the form of simple incised lines suggesting a site tradition of decoration (MacSween 2008a: 150). Three of the vessels have distinctive flat rims with grooves running around the lip and were all found in one defined area of Phantassie by the midden store, outbuildings and an area of hard standing (MacSween 2008a); it may be that one household deposited their pottery here (similarly a concentration of untempered sherds were found in the domestic area in Phase 3 at Phantassie) (ibid.). Some sherds from Fishers Road West are noted to have clear finger indentations (No.s 3, 5 and 6) and fingernail impressions (No. 5) and one Type 1 sherd from St Germains , but these are interpreted as accidental (Alexander and Watkins 2008: 225, Cowie 2000: 30). Noticeably, decorated pots are predominantly Type 1.


**Fig.58:** Pottery sherd BDU (probably Type 1) has three circular impressions arranged in a triangle. (photograph: M Maxwell)

Smoothing is recorded on few examples from East Lothian, though the numbers recorded are probably an under-estimate of the extent of the practice because of the poor preservation of the surfaces of late prehistoric pottery. Many vessels have evidence of wet hand smoothing in the small assemblage from Standingstone (24 sherds from 12 vessels) (MacSween 2009: 117). No smoothing is found on the Fishers Road East material, but there are some wipe marks on two vessels from Fishers Road West pottery, illustrative of neighbouring site specific manufacture practices (though we cannot be certain that they were occupied contemporaneously) (Cowie 2000: 30-33, Gwilt 2000: 135). Occasional oblique wipe marks are seen on the pottery from Newmains pottery and from St Germains (Alexander and Watkins 2008: 225). Seven sherds from Dryburn Bridge all have smooth, glossy outer surfaces which suggests that they were burnished when in a leather hard condition (Cool 2007: 73-75). There is a very high gloss on vessel number 63 from Dryburn Bridge (ibid.). Smoothing, and slipping, may have been done to decrease the porosity of the clay, but equally it will have been aesthetically pleasing. The act of smoothing using coarse textiles, and the impressions left, may have been an attempt to emulate sack-like containers or even basketry which has otherwise not survived in the archaeological record. Furthermore, the geometric and linear decoration on some Type 1 pots may have been for the same reason. The skeuomorphic nature of pottery has been discussed by Knappett (2002) and Manby (1995: 81-89) for Early Bronze Age pottery, and Rice (1999: 4-5, 7), on discussing the very origins of pottery, suggests that clay referenced archetypes of organic material culture including woven cloth bags, animal skin bags, bags and baskets of birch-bark.

### 6.3.2 Manufacture

Despite the variations in morphology just discussed, the techniques employed to make pottery were common across Iron Age communities in East Lothian. A basic method of preparation and manufacture was practiced. Clay would have been kneaded with a little water to make it an even consistency for working. This was the moment when temper was added. Kneading, however, does not seem to have been done for long by Iron Age potters in East Lothian since there are often voids in the fabric; this was witnessed in the Newmains and Broxmouth pottery and is noted in the Fishers Road East report (Gwilt 2000: 135). Levigation (which separates the coarser fraction of impurities in the clay by mixing it with water in a large tank) (Orton et al 1993: 117) was not practiced since inclusions in the pottery are often mixed and are not generally well sorted (for both Type 1 and Type 2), except perhaps in the case of the finer slipped ware from Traprain Law, where the extracted fine fraction will have been suitable for slipping (Miller 1985: 212).

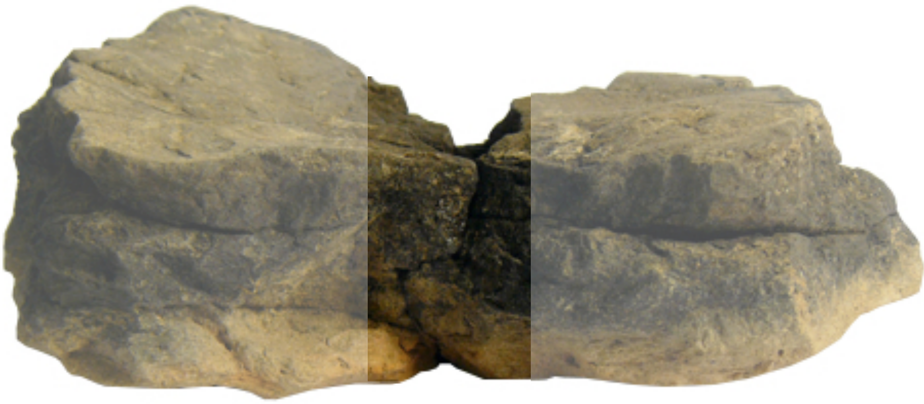


**Fig.59**: Showing the tongue and groove and slab construction of pottery, the N-junction has been highlighted. (photograph: M Maxwell)

Pots were made using the tongue and groove building method (H or N shaped) (Figure 59) (Cowie 2000: 31, MacSween unpub., MacSween 2008, MacSween 2008a, MacSween unpub. 2009). The pottery generally breaks along these joins and particularly poor bonding is noted on the assemblages from Fishers Road West (Cowie 2000: 31) and Broxmouth (Figure 58). Before firing they will have been left out to dry naturally to expel the added water. This may have taken place in the roundhouse or outside in dry weather. Occasional stress marks from drying (Orton et al 1993: 126) can

BOX 5

## Pottery Workshop

In March 2010 I took part in a pottery workshop run by Graham Taylor, a potter who specialises in prehistoric and Roman reconstructions.

Locally sourced clay with a sandstone component, naturally pinky/ red in colour was used. The clay had been stored in damp sacks for up to 6 months. The first stage was wedging and kneading the clay for up to 15 minutes with a little rain water. At this point liberal quantities of micacious grit and crumbled red sandstone temper, was added.

The pots were built using rings of clay added to a flat disc of clay, which were smoothed together

inside and outside with damp fingers. Trying to keep a consistent wall thickness and stable symmetrical form was tricky. Then they were decorated using antler tines, straw and plant bark rope, slate with incised notches and wooden rounded points.

In total 18 pots of varying size were laid out to dry on a wooden plank in the sunshine for 4-5 hours before firing on the hearth of a reconstructed roundhouse (based on an excavated site near Otterburn, Northumberland). The fire was lit at least 30 minutes before the pots were buried under kindling and ash in the centre. During the firing we had a BBQ sitting around the hearth.

We stopped the firing after 4 and half hours. Over half, mainly the smallest pots, had been completely fired and the rest were still slightly soft. The surfaces now had patches of grey and black, and the colour had changed to a lighter buff-pink with a black core. Three pots did not survive the firing.

(photographs: M Maxwell)

be seen on the pottery surfaces, although smoothing before firing will have reduced their visibility whilst preventing the pots from further fracturing in the heat.

Pots were fired in open pits (Arnold 1978: 351-357, Miller 1985: 228-232) or on the household hearth (Hodges 1976: 36, Box 5). Temperatures between 600 °C and 900 °C would have been sufficient (ibid. 27, Box 5). There are fire clouds, irregular patches of buff to orange and grey/ black, on the outer surfaces of the majority of late prehistoric pot sherds from East Lothian resulting from the lack of control of firing conditions (Gibson and Woods 1997: 52-53). The soft consistency of the fabric from incomplete firing on the Fishers Road East assemblage was also noted during thin-section analysis (Gwilt 2000: 135). Immediate and constant use on the hearth for cooking will also have helped to fire the pots.

## 6.4. Exploited affordances

### 6.4.1 Use: residue analysis of late prehistoric pottery

Sooting with encrustations or visible residues are frequently found on both Type 1 and Type 2 base, rim and body sherds from assemblages in East Lothian, indicating their use for cooking. There are exterior residues around the rim of some vessels from Phantassie (MacSween 2008a), Broxmouth and Newmains which may have resulted from food boiling over.

A project of residue analysis was conducted by the author in collaboration with the Broxmouth Hillfort Project and Professor Carl Heron (University of Bradford) (the full report is included in Appendix 10). The aim was to refine understanding of late prehistoric pottery use and chronology in south-east Scotland by investigating their functional and social roles through residue analysis on a representative sample of sherds from three excavated sites: Broxmouth, Traprain Law and Newmains. Additionally, it was hoped we could determine whether change in pottery fabric and form coincided with a change in pottery function over time and whether functional preferences for pottery varied between sites.

Analysis of residue absorption using Gass Chromatography Mass Spectrometry and isotopic analysis of carbon and nitrogen signatures of visible residues, was carried out on a selection of sherds from Broxmouth (18 sherds), Newmains (15 sherds) and Traprain Law (9 sherds). Newmains has not been dated but the whole assemblage is typical of the Late Iron Age. The sampled Traprain Law sherds are from recent 1999 and 2006 excavations dating to the Late Iron Age (MacSween unpub., MacSween unpub.2009). The sherds sampled from Broxmouth are from Phases 3, 5, 5/6 and 6; it was hoped this spread of dates would show any patterns of pottery function through time.

*Residue analysis results*

A summary of the results from GC-MS residue analysis are presented here, the methodology used and full results are provided in Appendix 10 (Maxwell et al 2012a).

Both Type 1 and Type 2 Broxmouth samples had abundant terrestrial fatty acids derived from meat preserved, some hydrolysis products from their degradation and traces of plant sterols. Otherwise the preservation of lipids was poor. Plasticisers were present and squalene, which derives from human handling, probably as a result of poor post-excavation storage conditions. Cholesterol was also present, but we must be cautious in interpreting this since cholesterol can also be found from fingers from handling. Therefore, some evidence for terrestrial lipids was obtained from these samples, with some evidence for plant sterols, and none whatsoever for aquatic lipids.

The lipids in the Newmains samples were well preserved, including large quantities of fatty acids characteristic of animal (likely adipose) products, alkanes and phytanic acid characteristic of ruminant animals and some shorter chained fatty acids. Ketones were also present, indicative of cooking at high temperatures (over 300°C) for long periods (Evershed 2008: 901). There are some plant derived lipids, but no evidence of aquatic lipids. Interestingly there is evidence for ricinoleic acid present in markedly high quantities in four samples. The significance of finding this unusual lipid is discussed below. Additionally, one Type 2 sherd gave markedly different results and had little or no residue preserved in the sample. This may be a quantification issue regarding the lack of lipids preserved in this sample, rather than true absence, or alternatively the result of a different use, possibly for storage of dry foods. This sherd is very similar in fabric and form to another sherd which had high ricinoleic levels. Therefore fabric and form did not seem to dictate how the pots were used or alternatively to affect the residues absorbed.

There is good preservation of a large amount of lipids in the Traprain Law samples, this is in part due their better storage conditions indicated by smaller quantities of plasticiser in the residues than were found in the Broxmouth and Newmains samples. The samples are dominated by fatty acids preserved in large quantities, which are characteristic of ruminant adipose tissues. Also present were degradation and oxidation products of these long chain fatty acids and again ketones (ibid.). Additionally, there are possible traces of plant sterols, for example the presence of A28 (octacosanol, an altered form of cholesterol).

*Discussion of results*

People at Traprain Law were using pots differently than people at Newmains. This is interesting, since during the Late Iron Age of East Lothian both of these sites are understood to be high status and Romanised, though Traprain is of course recognized as exceptional in the region. The residues from sherds from this period at both sites suggest however the exploitation of varied local subsistence economies. At Newmains both plants and terrestrial meats were consumed, whereas at Traprain few plants were consumed and in the majority of sampled sherds there was only evidence for large quantities of terrestrial meats.

Additionally, there is potential evidence for Roman imports at Newmains in the form of ricinoleic acid [castor oil], although due to a lack of comparative data this is currently difficult to contextualise. The finding of ricinoleic acid in four out of seven of the Newmains samples is of particular interest (this was not specific to a particular fabric or form of pottery), since this is the first time that ricinoleic acid has been found in prehistoric pottery residues from Britain. Ricinoleic acid is unusually abundant in castor oil, but can also be present in other plants in much lower abundance. It is also a known product of ergot (*Claviceps purpurea*). Ergot is unlikely in this instance, however, due to the absence of its degradation product ergosterol despite the preservation of other alcohols, such as cholesterol, in the same samples (Seitz et al 1977, Isaksson et al 2010: 3265). Castor oil was used in antiquity as an illuminant and is found as a residue on lamps (Columbini et al 2005, Copley et al 2005). It was also used in embalming in ancient Egypt (Tchapla et al 2004). Castor oil may also have been used as a food, for anointing (Plin.Nat.15.7), and for its medicinal properties for the skin and as a purgative (Pecci et al 2010). Castor oil is from a plant (*Ricinus communis*) which is widely grown in North Africa today, and probably also in later prehistory (ibid.: 619). This finding at Newmains potentially originated as a Roman import. However, its presence in so many of the Newmains sherds and its apparent absence across the rest of Romanised Britain urges caution; we need to bear in mind that the ricinoleic acid might, for example, derive from another processed plant which has not before been recognised in previous residue analysis studies.

Attempts to refine a typology for the pottery of East Lothian has proven problematic, since despite differences in coarse and fine morphologies, absorbed residue signatures vary irrespective of this. Understanding developments in pottery use over time has also proved difficult, due to the lack of preservation of the Broxmouth residues. Nevertheless, this project of GC-MS has added to our understanding of the complex and site specific biographies of pottery in the Iron Age of East Lothian. Since the findings do not show any clear patterns of use between pots of different fabrics and forms, rather differences in fabric and form may be understood as personal or community choice (since the choice was apparently not a functional one). The difference between coarser and finer fabrics may be indicative of restricted access to particular clay and temper resources by certain individuals or households. The residue-rich sherds from Traprain Law in particular suggest that pottery lived long biographies and was therefore valued.

Overall, the GC-MS analysis of visible residues on the late prehistoric pottery from Broxmouth, Newmains and Traprain Law found that the type of fabric or percentage of temper does not alter the quantities of lipids preserved. Taphonomy, conservation or storage issues may have, however, particularly affected the residues preserved in the samples from Broxmouth, since unfortunately these residues did not preserve well except in two examples. This could be due to taphonomic or storage issues, since contaminants from handling and plasticizer residues (from storage in plastic bags) were present in high quantities. Broxmouth is situated on a limestone outcrop, which may also be a factor affecting preservation and the sherds were also stored in plastic bags without acid free tissue paper. In samples from both Newmains and especially Traprain Law there is less plasticiser indicating fewer potential problems introduced from issues in conservation and storage affecting lipid survival.

Furthermore, the results show that no differentiation in pottery function can be ascertained on the differences of form or fabric, since results are often similar between the Type 1 and Type 2 samples taken from each site. Therefore, function does not appear to have been predetermined by the use of specific clay or temper resources. This undermines the applicability of a typology based on morphology and function. Differences in fabric can alternatively be understood in terms of the preference of the potters or issues of access to resources (type of clay and quality of temper), rather than as functional. Overall, due to the lack of preservation at Broxmouth, it was not possible to ascertain whether there was a chronological change in how pottery was used. What the results do show, however, is that differences in the use of pots are apparently site specific. Creating regional pottery chronologies and typologies without analysing residues from site assemblages is thus highly problematic.

### 6.4.2 Use: Roman pottery

The Roman pottery found on native sites belong to a class of fine wares presumed to be used as drinking vessels, or for the display, serving or storage and trade of food. However, an analytical study of the organic residues that may have been absorbed into the fabric of samian as a result of such uses was carried out on a selection of sherds from Roman sites in southern Scotland (Thomson unpub. 2010). Only one samian sherd out of the six vessels sampled revealed evidence of an archaeological residue. Several possibilities are listed to affect this result; different fabric porosities, the presence of a slip preventing residue absorption, the slip being easier to clean, and changes in use including lower temperatures in table wares and the presence of different food (ibid.: 62-63). One samian sherd from Broxmouth, a Dragendorff 37, was analysed using Gass Chromatography Mass Spectrometry (GC-MS) as part of the project of residue analysis carried out by this author presented above, but the sample returned a result showing no evidence of archaeological residues.

It has been suggested that there is another reason for the presence of samian on native sites aside from communities developing Roman culinary tastes. The deliberate rubbing away of rims on samian ware at Hurley Hawkin, Angus, and Dun More Vaul, Tiree, was noted by Henshall (in Robertson 1970: 208) and by Hunter on samian ware from Fairy Knowe (Hunter 2007: 37). It has been subsequently suggested that they were used as rubbers or smoothers (ibid.) or for making pigment (Hunter 2000: 301 and Hunter 2007: 37). Indeed, the majority of these Roman pottery fragments are fine-grained and pink/red (samian) or orange (Roman coarseware) in colour, except for the small number of grey/black Castor ware fragments from Traprain Law (Robertson 1970: 208). The richness of the colour of samian in particular will have been suitable for making reddy orange pigments when ground down with a binder such as bees wax, resin, gum, oil, fat, blood or even semen (Carr 2005: 276). Therefore the ways in which samian were used were linked to fine-grained cobble stone tools or to nodules of hematite or ironstone (Chapter 5).


**Fig.60:** Re-worked sherds of samian from Traprain Law. *Left,* a base sherd whorl. *Right,* an abraded sherd with facetted edges and worn away area on surface indicating possible use for making pigment. (photographs: M Maxwell)

The samian fragments found on East Lothian Iron Age sites (Appendix 1) have evidence for deliberate chipping, fragmentation, grinding and polish (Figures 60 and 61). This suggests that they were not used exclusively as tableware, and supports their use as smoothers, polishers and pigment (Hunter 2000: 301, Robertson 1970: 208). Approximately 60% of the samian from Traprain had shows evidence of wear from secondary uses or re-working (Hunter 2009: 155). At Broxmouth three fragments from a samian bowl, which do not quite re-fit, were found in a hoard in House 1 from late Phase 6 (Figure 71). One of the three sherds is markedly more abraded than the others, and has a ground bevelled facet which has removed the shiny slip on one corner and a series of incised notches down one side (FJS/No.144, Figure 71). A series of small chipped notches can also be found down one side of a samian footring fragment from a different vessel found in the hoard Phase 5/6 midden in the Inner Ditch (COO/No.142) (Figure 61). The sherds found together in House 1 perhaps underwent different biographies before being re-united in deposition. Also included in the hoard was a broken Roman bottle glass fragment and five broken fragments from different glass bangles, of which one of the broken ends has been subsequently worn down from grinding or smoothing. The assembly of broken opaque and shiny object fragments, which also have the ability to spark when chipped or rubbed, seems to have been deliberate. Parallels may be drawn with the hoard at Dryburn Bridge in which an iron sickle, sherd of Roman glass, shale bracelet fragment, and piece of chipped stone were placed in a potential souterrain, dated to before AD cal 80-320 (Dunwell 2007: 71). Again, the assembly of these materials reference their electrostatic and transformative powers.

**Fig.61:** Footring of Southern Gaulish, Flavian. Dragendorff 27 samian, with an external groove (COO) found in a Phase 5/6 midden in the Inner Ditch at Broxmouth. This fragment is extremely worn and abraded and has a rounded polished edge on the bottom left and three nicks cut into one side, seen here. *Not to scale.*(photograph: M Maxwell)

Broken sherds from the necks of flagons were found at both Archerfield cave (Cree 1909: 255, 257) and Knowes (Heslop et al 2009: 127). It is probable that the amphora referred to by Curle in his 1932 article found at Ghegan Rock is actually this example from Archerfield, as his description resembles the fragments from Archerfield seen by this author in the National Museum of Scotland (Curle 1932: 288). Hunter in his 2009 publication only refers to one other example of amphora fragmented at the neck from the East Lothian Iron Age, but he too mistakenly identifies it as from Ghegan Rock (Hunter 2009: 155). The finding of amphora and flagons dismembered at the neck at Archerfield cave and Knowes (Figure 62) suggests a common pattern of fragmentation, perhaps the debris from performances spectacularly spilling the contents held by the flagon. The five fragments from the same amphora at Knowes were found in an infill deposit of a structure in the same context as a smashed quern (SF 41, Figure 62) (Willis 2009: 123), perhaps as part of a dramatic closing performance. One amphora base fragment was found in the oven of this structure in which was also part of the same smashed quern (ibid.).


**Fig.62:** The dismembered neck fragment with handle broken off from a Roman amphora found at Knowes in a house abandonment deposit. There were also four base fragments from the same vessel found in the same context, alongside a smashed lower rotary quern (SF 41). (photograph: M Maxwell)

### 6.5 Deposition

Pottery was rarely found in primary contexts at Broxmouth and across the East Lothian Iron Age. At Broxmouth most pottery ended up in midden deposits infilling the Inner Ditch or over the South West Entrance roadway in Phases 3, 5 and 6. The apparent aceramicity of post-hillfort occupation in Phase 4 can be explained as due to the lack of excavated secondary deposits, such as middens, dated to this phase. The absence of pottery in Phase 2 can be explained as taphonomic (as discussed in Section 6.1.3). However, it is surprising that no pottery (except two sherds GAS and GAT) were found in Phase 1 at Broxmouth, when we have evidence for metal working activity and settlement.

Additionally the houses in the interior at Broxmouth were kept clean. There is a pit in House 2 (DEA) which includes both Type 1 and Type 2 pottery sherds, either indicative of their contemporaneity or the residuality of Type 1 (the majority in this pit are Type 2). There are only occasional references to swept-up deposits including non re-fitting sherds up against walls. A base sherd was found associated with a hearth in House 4, demonstrating that pottery was being used for daily activities (finds code EMT, submitted for residue analysis, Section 6.4.1).

The contextual evidence of late prehistoric pottery throughout other sites across Iron Age East Lothian shows secondary deposition in midden spreads and midden deposits in ditches, pits and houses. The structured deposition, re-deposition and even curation of middens has been noted at Broxmouth and Phantassie (Lelong 2008: 264-266) and is argued to have been a widespread practice in south-east Scotland. For example, the late prehistoric pottery and samian were found in a deposit over a house at Craigs Quarry which "could in no way be explained as a naturally accumulated deposit, and can only be interpreted as the product of a deliberate act whereby two and more feet of earth and large stones were laid down over the site" (Piggott 1958: 70). As already mentioned, the majority of the pottery from Broxmouth comes from Phase 5 (starting around 255-200 cal BC), Phase 5/6 or Phase 6 infill layers in the Inner Ditch and from the South West Entrance during its later use and abandonment. Although later in the stratigraphical sequence the radiocarbon dates for the upper midden deposit CBM in the Inner Ditch in Phase 6 are earlier (540 cal BC to 230 cal BC SUERC 35125 and 35126) than radiocarbon dates associated with the upper levels of structures C and F (410 cal BC to 190 cal BC SUERC 35104, 35105, 35106 and 35107) which came first (Hamilton et al in prep. 2013). Similarly, radiocarbon dates show the use of old material to repair the roadway in the South West Entrance in Phase 6 (GU-1202 and GU-1226 give dates of 570 cal BC and 195 cal BC respectively).

Additionally, at Broxmouth, the earliest episode of pottery deposition occurred at the end of Phase 3 with *terminus ante quem* 400 to 365 cal BC (Hamilton et al in prep. 2013), probably around 410 cal BC to 200 cal BC (SUERC-36093, 36097, 36098, 36099, 36100, 36101, 36102), during the quick infilling of the ditches in the South West Entrance prior to occupation on the Inner Ditch, in the same series of contexts which included structured deposits of smashed cattle skulls and articulated cattle and sheep bones. The burnt postholes around the perimeter of the South West Entrance middle ditch terminals and nearby deposits of burnt sand are also dated to this period of activity. This tightly dated sequence ended with two separate internments of a de-skinned and articulated ewe, and a whole lamb (Cussans in prep. 2013). Within these quickly deposited layers 19 vessels are represented, including three groups of 8 or more Type 1 sherds, suggestive of the deposition, perhaps even smashing, of whole vessels as part of feasting performances also involving fire and deposition of meat. The deposition of pottery at the end of Phase 3 is therefore not typical.

The distribution and abraded conditions of the large assemblage of late prehistoric pottery in different phases at Phantassie has been recorded in detail and the possibility that sherds and vessels were meaningfully placed in curated deposits comes to attention (Lelong 2008: 251-255 and Appendix 4). For example, four highly abraded sherds from the same vessel were found in the midden wall fill of a house in Phase 2 (1st or 2nd century BC) in contrast to the 80% of the assemblage from this phase which were highly abraded singular sherds all of which were found on old surfaces (ibid.: 253). In Phase 3 (1st century BC into 2nd century AD) most sherds were found in single episodic deposits of midden in hollows, except for a concentration of large abraded sherds from a maximum of 21 vessels which were found in a midden spread over and around an old abandoned house (ibid). In Phase 4 (2nd and 3rd century AD) sherds were found in the floor of a new structure (ibid.), and can be regarded as a possible foundation deposit. In the final phase of Phantassie (the site was abandoned middle of the 3rd century AD) most of the abraded sherds were found trampled into surfaces, but some conjoining sherds from vessels had been thrown into an abandoned house (ibid.).

A shift in dominance from Type 1 in the middens overlying the occupation in the Inner Ditch at Broxmouth to Type 2 pottery in the uppermost middens in the Inner Ditch was noted. However, the dates from the earlier middens overlying the occupation suggest accumulation over a 200 year period from c.500 BC, the radiocarbon dates from this stratigraphic sequence complement each other well (SUERC-35123 to 35126). Contrastingly, as just mentioned, the varied and older radiocarbon dates from the uppermost middens show a different pattern of re-deposition; the dumping of old deposits from different areas ranging between c. 400 cal BC and 50 cal BC (SUERC-35127, 35131 and 35133). This supports the idea that Type 1 and Type 2 may not be chronologically significant but rather is linked to specific locations on site from where these middens originated.

In the Interior during Phase 6 at Broxmouth, pottery was found in curated midden contexts over the stances of houses (House 3, 4, 5 and 7) marking a structure's abandonment or beginning of a new phase of refurbishment and occupation, in the fill of wall cores, for example in Stage 3 of House 4 (ibid.) and occasionally postholes (ibid.). Additionally a group including three base and three body sherds from the same Type 2 vessel (FCX, GNT, EZJ), a rim and body sherd from a Type 1 vessel (EKZ/X) and another group of six sherds from a Type 1 vessel (EMZ) were found in a Phase 5 midden deposit sealing the intermediate stage (Stage 2) of occupation in House 4 (also discussed in Chapter 4, Section 4.6). In this deposit there was also a human mandible fragment, a human cranial fragment, two fragmented and blackened antler pedicle domes and a bone pin (DKX, DKW and DLA). The sherds are extremely abraded and may have been deliberately smashed into the midden which was then used as a closing deposit for this structure. On top of this deposit were placed, apparently deliberately, pieces of a smashed ox skull (Broxmouth Hillfort Project archive 1977-78). The human cranial fragment (No.14) was directly dated 50 cal BC to cal AD 90 (SUERC 24259), whereas two faunal bones from the deposit were dated 200 to 30 cal BC (GU-23353 and 23354). This may suggest that the disarticulated human bone fragment was deposited at the end of this intermediate infilling episode, perhaps as a foundation deposit for the next stage of occupation of House 4.

An abraded sherd and stone ball were both found in a secondary stage House 4 posthole which was retained in use in later stages. There are no deposits recorded filling the postpipe and so it is not clear whether these objects were deliberately included or were from the previous phase of activity and included accidentally. Other examples of groups of sherds from the same vessel in Phase 6 at Broxmouth occur in an unstratified internal posthole in the east of House 3 (DZJ, two body sherds), the terminal midden infill of House 5 (CSX, one rim and one body), the midden underlying a wall in an intermediate stage of House 6 (EZJ, three base and three body sherds), the terminal rubble infill of House 7 (CYQ, two body sherds) and in an unspecified context in Area 8 in the Interior (CYQ, CYP and FOK, two rim sherds and seven body sherds). It is also possible that out of the nine sherds found in a pit by the entrance of House 2, three were from the same Type 2 vessel (BFE, BGJ, and BPA) and another three from a probable Type 1 vessel (BIW, 2 body sherds and BDR). This pit was dated 100 cal BC to cal AD 130 (GU-22210 and GU-22211).

Elsewhere, there are few late prehistoric pottery sherds found as part of *in situ* or structured deposits in settlements in Iron Age East Lothian. The best example is found at Knowes in the abandonment deposits of structure CS2 (SF 41) in which there were several ‘smashed and scattered’ fragments from the same roman flagon associated with hearth debris and the smashed lower rotary quern fragment, all of which are thought to be the remnants of a closing feasting event (Haselgrove et al 2009: 89, Hunter 2009: 140). This has also been linked to the structured deposition of an Iron Age coarseware pottery rim fragment set into the surface of the southern ditch terminal at this site (ibid.). The flagon fragments at Knowes include part of a base and a rim and handle sherd broken at just under the neck (MacSween 2009: 122). A Roman coarseware flagon fragment is also found at Archerfield, East Lothian, broken at the neck (Figure 62). This suggests a common pattern of fragmentation. Large unabraded fragments of a vessel were deposited in the central posthole in a ring-groove house at St Germains (Alexander and Watkins 1998: 213-214, 226). These sherds refit others found in an intercutting pit in a thick layer of charcoal, along with a fire-cracked pebble. In an adjacent central posthole a fragment of samian was found, but this may be intrusive as animal activity had introduced burnt bone and clay into the pit (ibid.). The assembly of a heat fractured pebble, charcoal and pottery in deposition may be a deliberate reference to the transformative power of fire involved in pottery manufacture, to aid transformation into their next biographical stage.

Samian at Broxmouth was deposited in a late context over Phase 5/6 at the South West Entrance (one fragment COO), in an upper midden in the Inner Ditch in Phase 5/6 (one sherd DAD), in the Phase 6 hoard in House 1 and in the terminal midden infill of House 7, Phase 6 (one sherd CMC). The hoard which cuts into the later layers of House 1 with three sherds of samian from the same bowl (one body and two bases of a Dragendorff 18 or Dragendorff 18/31 (Greene and Cool in prep. 2013)) also included five different pieces of worn and abraded glass bangles and a fragment of green Roman bottle glass (Figure 71). All of these artefacts in the hoard were found concentrated in a small area and were probably originally in an organic container, there are two other glass bangle fragments from unstratified contexts. The fragment DAD (No.1200) found in the Inner Ditch is very similar to the fragments from the hoard and may be from the same bowl. It can therefore been suggested that samian arrived as complete vessels on-site to be fragmented and re-worked, and it is likely that the sherds in the hoard were curated for multiple generations before their deposition. The type of glass bangles in this hoard are typical of other examples found on other Late Iron Age native sites in southern Scotland, the largest assemblage known is from Traprain Law (Bruhn in prep. 2013). Three of the glass bangle fragments are shades of white, with grey, green or yellow tints, one is ice-green and the other opaque yellow. Bruhn has noted that the popularity of white glass bangles in Central Britain and the occurrence of them in this hoard is interesting and that this is because they were skeuomorphs of antler and/or bone. Furthermore, antler, bone and glass are all similarly smooth materials. To create the opaque white colour bone ash may have been used (Bruhn *pers comm*). Although we have no evidence of bone or antler bangles there are decorated objects of adornment made of these materials in the Broxmouth assemblage (Chapter 4). Bone and antler were also occasionally deliberately heated to be black in colour perhaps to imitate jet or shale, which in turn were often used to make bangles or other ornamental objects (Box 1).

Furthermore, the curated samian fragments from the hoard are all abraded, worn with rounded edges, chipped and ground. As discussed in Section 6.4.2 the samian fragments from the same vessel look to have underwent different biographies before being re-united in deposition. Additionally, one of the bangles has secondary use-wear  at one end where the glass has been smoothed from rubbing or grinding. These ground-down polished and fragmented pieces of shiny materials, which have electrostatic properties, were re-united in deposition perhaps to mute their transformative powers. The glass bangle fragments may also be included to explicitly reference female fertility; Bruhn argues that because the glass bangles from the hoard fall within two broad ranges of small diameters (50-55 mm, four bangles and 60-65 mm, two bangles), they were worn by at least two individuals who were probably adolescent women (Bruhn in prep. 2013). The bringing together of these bangles belonging to women, with other materials which embody spectacular transformative power, may have been part of a social re-structuring event linked to the coming of age and fertility of females.

The depositing and remembering of fragmented identities is perhaps also the case in the terminal infill deposit of House 7 in which one of the samian base sherds (finds code CMC), two refitting sherds of late prehistoric pottery (see above) and a human left radius midshaft were found. This human bone fragment could not be sexed, but has a peri-mortem fracture (a fracture which has occurred a short time before the death of the individual and which has not had time to heal) (Chapter 4, Section 4.3). This samian base sherd has had parts of its footring chipped off before disposal perhaps for making pigment. The link between ferrous red pigments and blood has been discussed elsewhere (Section 6.2.2). The dating range obtained for this structure's terminal infill obtained from the human radius shaft 40 cal BC to cal AD 130 (GU-18739) is slightly earlier than the sherd of samian which is dated to the early Antonine period (c.138 AD). This may suggest that the samian fragment was deposited here after the main episode of infilling, an act remembering the human bone fragment perhaps deposited up to a generation before, or alternatively that the human bone fragment was curated before deposition in the midden, at the same time as the samian sherd.

## 6.6 Conclusions

All the resources required for making pottery (clay, temper and water) were available locally. However, there are subtle variations between sites and inter-sites within the late prehistoric pottery assemblages which may suggest that different sources were being appropriated by different groups of people or over time. The manufacture of late prehistoric pottery was relatively unskilled, required little know-how and no specialist equipment or super-structures. Variations in body and rim form of late prehistoric pottery are probably representative of individual or community preference and technique. There is a shift in the dominance of Type 1 to Type 2 in Phases 5 and 6 at Broxmouth, and this may represent a change in the networks of engagement for appropriation of resources rather than for a functional reason. Residue analysis of encrustation showed that there is no proven link between function and the design of late prehistoric pottery since different rim forms and variations in the percentage of temper in pottery fabrics at Broxmouth, Newmains and Traprain Law did not affect the preservation of residues. Furthermore there was not any significant patterning between the types of residues absorbed and these different design factors. Rather choices in pottery manufacture were a result of individual or community preference, or resource availability perhaps controlled by generational ties or territorial rights.

In addition, the chronological development of Type 1 to Type 2 may be misleading since the deposition of predominantly refitting sherds from Type 1 late prehistoric vessels at the end of Phase 3 at Broxmouth was not typical of depositional practices in Iron Age East Lothian. This was part of a quick infilling episode of the Outer, Middle and Inner Ditches in the south-west Entrance around 410 cal BC to 200 cal BC (SUERC-36093, 36097, 36098, 36099, 36100, 36101, 36102) along with other unusual deposits of smashed cattle skulls and articulated sheep and cattle remains.

There may be a link between pottery manufacture and the agricultural cycle. Seed impressions found on some late prehistoric sherds may be iconographic of this, and the saddle or rotary quern may have been used to grind temper. However, at the same time pottery manufacture does not require specific environmental conditions and could have happened during any season. There is also a link between pottery manufacture and ferrous metalworking; both processes share many gestures and forming techniques. Both are risky processes which require the action of heat to aid transformation. Modern ethnography show that both activities are governed by taboos, for example often sexual intercourse between couples is forbidden during pottery manufacture and the smelt (see also Chapter 7).

Late prehistoric pottery and Roman samian and coarse-ware may have been perceived as bodily substances. Samian may have been ground down and used to create pigments, similar to hematite (Chapter 5). The association of a chipped samian fragment with a disarticulated human radius fragment with peri-mortem trauma in the terminal infill of House 7 may be significant. The iron content in samian will have meant that when ground down it would have smelt similar to hematite and blood. Additionally the phenomenon of geophagy (the bodily consumption of clay and pottery) may have been practiced in Iron Age East Lothian, although this is impossible to prove.

The fact that many of the late prehistoric pottery sherds are residual and occur in re-deposited contexts is an obvious problem. The quantity of pottery recovered from each phase at Broxmouth is biased to those in which large midden contexts were excavated, and houses in Phase 6 were kept relatively clean with pottery found in postholes, pits, midden and rubble infill deposits in the Interior. Throughout the Iron Age of East Lothian, late prehistoric pottery was deposited in middens, often along with worked bone and antler and worked stone. Pottery was perhaps a deliberate nutritional addition which would benefit the use of middens as fertiliser on the fields. Refitting late prehistoric pottery fragments were included in foundation/abandonment deposits in Houses 2, 4, 5, 6, and 7. At Phantassie there is also evidence for refitting pottery sherds in what can be interpreted as foundation or abandonment deposits.

Similarly, the deposition of Roman samian and coarsewear is part of meaningful performances marking moments of transition. Samian was probably imported as whole vessels but then fragmented and the separate fragments curated over several generations. For example, the hoard in House 1 included three fragments of samian with differential wear from the same vessel, assembled with broken, ground and chipped objects of glass; these were all materials with transformative powers (Figure 71). A chipped samian fragment was found in the terminal infill of House 7, Phase 6 in which was also a disarticulated human bone fragment and refitting late prehistoric pottery fragments. The dates potentially suggest that the human bone fragment may have been curated before deposition in midden with the samian fragment, or the samian fragment may have been deposited a generation after the human bone fragment.

Roman pottery and the human body were, therefore, treated and curated in similar ways. Human bone fragments were also found in midden infilling contexts and there is evidence for their curation. For example, a human bone fragment was deposited towards the end of a transitional midden infilling episode of House 4 at Broxmouth, before re-modeling and occupation of the structure occurred. A flagon at Knowes was smashed and the amphora at Archerfield beheaded. The disembodied head was important in Iron Age cosmologies, as demonstrated by the 19 disarticulated human remains 13 of which were fragments from the skull found in Iron Age contexts across Broxmouth (Chapter 4, Section 4.3). Therefore, it seems clear that pottery and identity were inherently linked. During the Roman Iron Age there are clear moments of social re-structuring by smashing and fragmenting identities and by taking things out of everyday use.

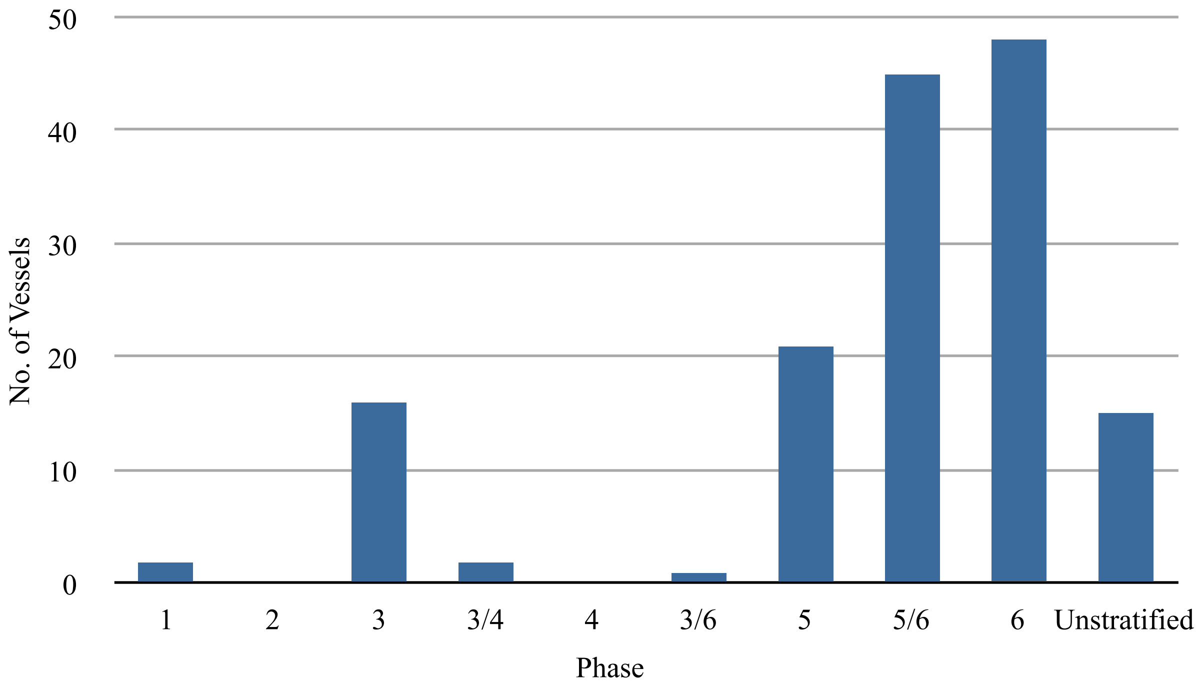



**Table 12**: Bar chart showing the minimum number of vessels found in each phase at Broxmouth. Importantly Phases 2 and 4 are aceramic.

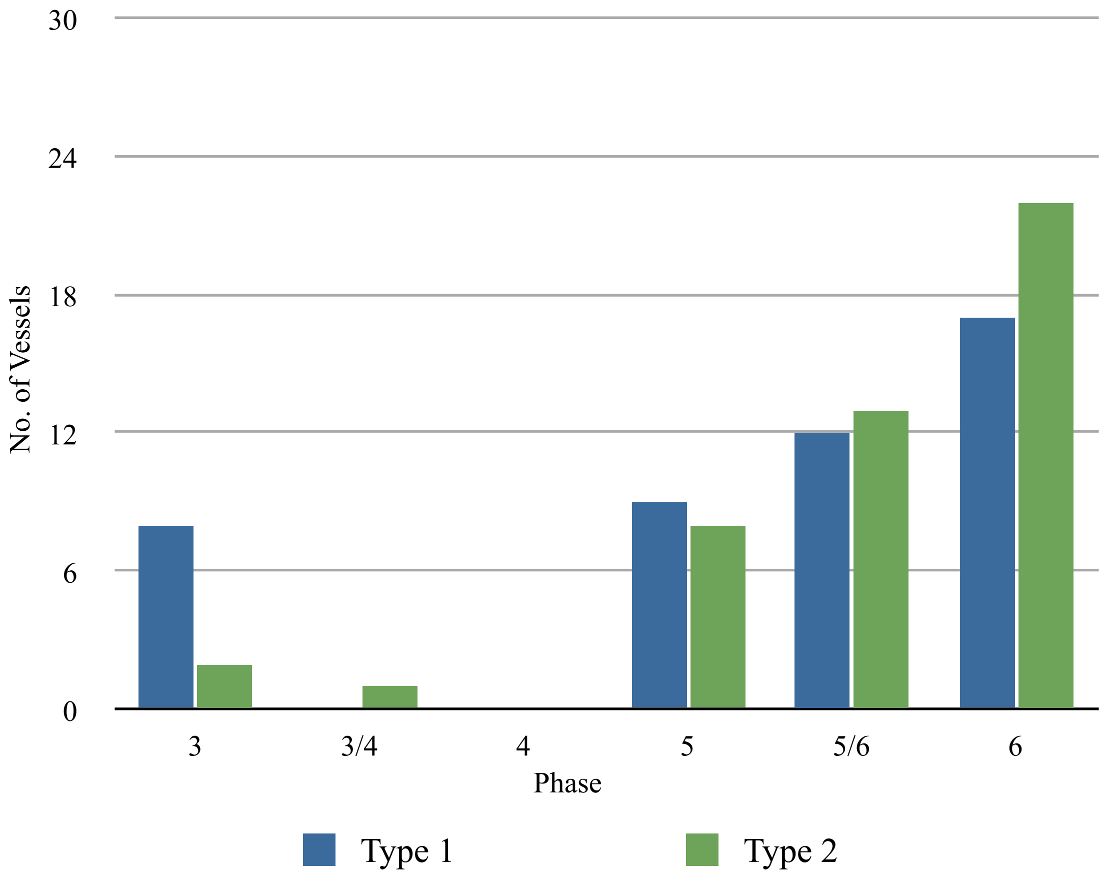



**Table 13:** Bar chart showing the number of Type 1 and Type 2 vessels present in Phases 3-6 (no pottery was found in Phase 1 except for 2 fragments which could be intrusive, and none in Phase 2). At first glance this may seem to suggest a slight transition from Type 1 to Type 2, but it is argued this is more likely due to the type of contexts in which they are found (Table 14).

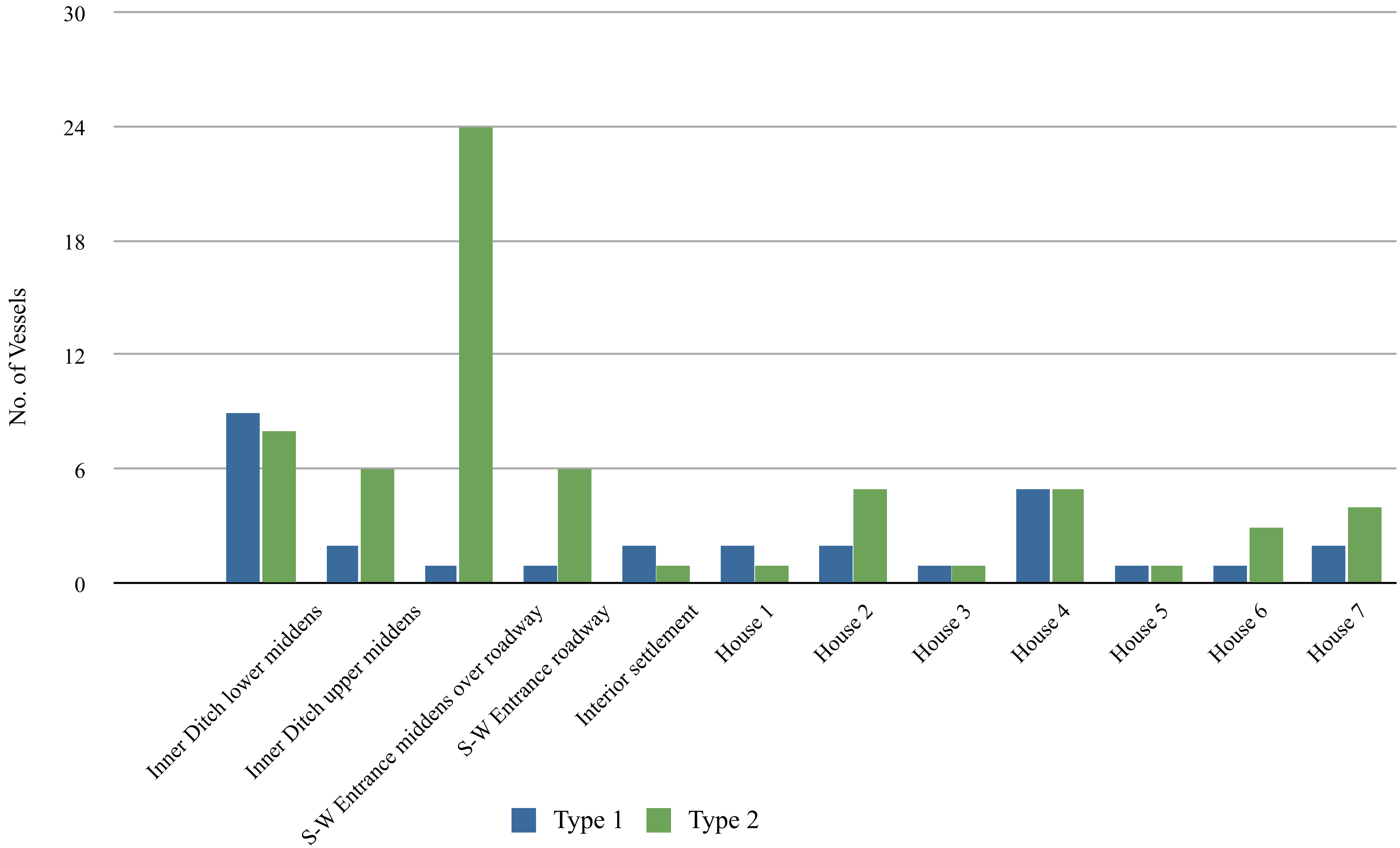



**Table 14:** Type 1 and Type 2 minimum number of vessels by Phase and Area at Broxmouth. The contemporary distribution across the areas brings into doubt the chronological development of pottery.

# Chapter 7 Copper Alloy and Iron

Evidence for small scale copper alloy working is found on 15% of excavated Late Bronze Age and Iron Age sites in south-east Scotland, including Traprain Law, Fisher's Road East and West, St Germains and Broxmouth (Appendix 1, Figure 63). Iron was smelted on nine excavated sites (25%) (Figure 63), but it was smithed more widely as approximately 33% of Iron Age sites produce evidence of smithing slag or debris. Both copper alloy and iron share certain principles in their manufacture, and are used together or interchangeably to create various types of brooches, pins and fittings. This chapter will explore these and other similarities, as well as the differences between each of their materialities. The products created from copper alloy and iron will not be the sole focus, but instead this chapter will consider their whole biographies; appropriation, smelting, smithing, use and deposition.

## 7.1 From product to performance

The research background of these materials in Iron Age studies has, until recently, been hampered by culture-historical and typological approaches. However, there is an emerging body of work which recognises the performance of iron working, as playing a significant role in Iron Age cosmologies and the establishment of social relations. Comparatively copper working technology is not as well understood (Dungworth 1996, 1997, Salter and Ehrenreich 1984), while there is also a lack of copper alloy working evidence found in excavated sites in the British Iron Age. This has meant that the focus has been on the better understood technology of working iron. Furthermore, material culture studies of Iron Age Britain have focused on the objects of copper alloy and iron from southern England (e.g. Craddock 1986, Ehrenreich 1985, Ehrenreich and Salter 1983, Fitzpatrick 1984, Northover 1984, 1991) because of their greater visibility in the archaeological record.

In south-east Scotland the Iron Age corpus of metalwork is relatively small, dispersed, often difficult to date and as a result has not often been subjected to scientific analysis. Interpretations of the origin and development of metalwork in northern Britain have instead been directed by diffusionist theories and the focus on particular individual finds and a very few sites (such as Traprain Law) (e.g. Burley 1955-56, MacGregor 1976, Robertson 1970, Stevenson 1966). Recently this has been re-addressed by Hunter (1997) who has taken a contextual approach in an effort to understand the different depositional treatments of the corpus of Scottish Iron Age metalwork regionally and through time, and Dungworth who has carried out a large scale scientific analysis of late Iron Age copper alloy objects from northern and southern Britain (1997, 1996). In both these analyses metalwork is understood as knowingly appropriated in accordance with local tastes and traditions, and thus regions are not simply envisioned as receivers but as agents in the development of metalwork traditions and technology.

For the majority of the Iron Age, in continuation from the Late Bronze Age, copper alloy and iron working are thought to have been distinctly small scale local practices (Ehrenreich 1994, Northover 1984). This is until an advent of 'materiality' (expression of identity through material things), which is believed to have occurred around the start of the first century AD along with an 'explosion of metalwork' and hierarchical social systems (Hunter 2006, 2007, 2007a: 289). However, it is helpful to consider Taylor's (1999) warning of assigning value to metal artefacts based on quantification and their visibility in the archaeological record in reference to the final Eneolithic in Eurasia. Taylor's complex calculations illustrate the complex cultural treatment of metal, its recycling and curation in this region over time. Similarly we may be greatly underestimating the significance of metal in earlier periods due to its supposed absence and archaeological invisibility because of an interpretative emphasis upon quantification and hence Marxist ideas of value (ibid.). A relative absence of metal in the Early and Middle Iron Age has perpetuated the view of its insignificance at this time. Alternatively, 'the relative absence of metal is a sign of its developing worth, and its growing association with...funding and prosecuting warfare' also associated with hoarding activity, re-cycling and re-use which may have had symbolic meaning...The deposition rate for Eneolithic copper artefacts could easily have averaged 50% of the 25,000 per-year produced...it was counterbalanced by a synchronous retrieval and recycling rate that could have been 90% of this half' (ibid.: 29).

There is evidence for the working of iron in Phases 1, 2 and 6 at Broxmouth. Therefore, the absence of decorative metal objects in the Early and Middle Iron Ages in south-east Scotland does not necessarily mean that metal played an insignificant role in cosmology and identity formation. Indeed, DeRoche (1997) was concerned by a bias upon the 'better preserved materials, ceramics and metals, and the characteristics and distributions of the end-products' in British Iron Age studies (ibid.:19). Instead, she argues, the focus must shift to examine the entire production sequence from raw material to use (ibid.). However the model proposed by DeRoche for a more socio-culturally integrated analysis of production sequences remained functionally, behaviourally and ecologically determinist. Certain stages in the manufacture, trade and exchange of iron had previously received attention in British Iron Age studies. Chaîne

Opératoire (Lemmonier 1986) approaches examining the manufacture, trade and exchange of iron objects have been carried out by Ehrenreich (1985), Hingley (1990), Salter (1984, 1991) and Salter and Ehrenreich (1984). The only detailed account of copper alloy working has been carried out by Northover (1984) focusing on the evidence from central southern England. In these studies the signative value of stages involved in transforming ore to metal were largely overlooked and instead functional descriptive accounts were favoured. Chaîne Opératoire risks a purely descriptive and procedural approach towards making where people act upon mute materials and pragmatic functional choices are given precedence (Dobres and Hoffman 1994, Keller and Keller 1996: 175). Again, the basis of interpretation was dominantly upon styles and forms of material culture and their use as elite items. For example, Northover's (1984) account of copper alloy working is based on an idea of a hierarchical organisation of craft where tools are contrasted with prestige items (weapons and ornaments) which required greater labour input and skill along with single use moulds and specialist tools (ibid.: 138-139). Recycling and the repair of objects was the lowliest of all, envisaged as a part-time and semi-skilled activity (ibid.). On the contrary, value is contextual, biographical and not necessarily reliant upon any innate material quality, material rarity or labour investment (Appadurai 1986).

Hingley's paper *Iron, ironworking and regeneration* (1997) is an attempt to overcome the parameters set by DeRoche (1997) and the underlying dichotomies of pragmatic versus symbolic. For example, iron ore may have been harvested from the field like crops (Hingley 1997: 10), part of agricultural cycles linked to ideas of birth and death. As was discussed in Chapter 5, a number of querns from Iron Age sites in East Lothian have evidence for metal sharpening grooves. Metal, stone and grain are inter-related and all part of the agricultural cycle; metal tools were used to harvest the crops, the seeds of which were then ground on the quern. Therefore the recycling of metal practiced at many Iron Age hillfort sites may not have simply made economic sense, but may have been interlinked with ideas of renewal and re-animation (Giles 2007, Hingley 1997). It has been noted that querns used for grain were also used to grind ore (Chapter 5) and that before smelting, ores may have been roasted to remove impurities “a stage which parallels the parching or drying of grain” (Giles 2007: 400). Hingley (1997: 12) argues that the location of metalworking debris very close to enclosure entrances (as at Bryn y Castell, Wales and Maiden Castle, Dorset) was linked to the idea of regeneration, where entrances were viewed as both peripheral and as places of access/egress.

Giles (2007: 406) explores how new political authority was made ‘thinkable’ via the metaphorical associations of smelting iron with fertility, skill and exchange. New leaders are ‘forged’, young adults ‘tempered’, alliances ‘welded’ together, violence and anger ‘quenched’ through revenge or reparation,’ (ibid.: 406). The transformation of ore to iron was a metaphor for understanding social transformation, where the ability to control such a powerful regenerative and simultaneously destructive creative process required participation in a network of social relations and access to skilled know-how (ibid.). The expressed inalienability and alienability of these relations were a crucial factor in becoming powerful; defined in terms of authority, prestige and worth (ibid.: 406, Helms 1993: 14). Possessing practical know-how of metalworking techniques made a person powerful or magical, whereas ignorance meant that power was invested in others who held these skills. Giles’ approach, based on ethnographic analogy, takes into account the mutual agency between things and people, and the life biographies of artefacts; overcoming a depositional bias in interpretation. Working iron enacted new ways of thinking through associations between life, death, power and identity (ibid.: 395). Importantly, performance is central to her argument. For example, it is argued that the considered performance of placing iron-working tools alongside carbonised grain in a pit of Middle to Late Iron Age date at Garton Slack, East Yorkshire embodied ideas of regenerative and destructive power (ibid.). The structured deposition of a bronze tool beneath one of the ramparts at Eildon Hill by an entrance (Rideout et al 1992 : 61) and the peripheral locations for iron working and probable furnaces at the enclosed site Fishers Road East (Lowther 2000a: 140), also suggest an important link with marginal transitional places and metalworking's transformative powers perhaps not widely understood by inhabitants but only by a few, heightening its mystery. At the same time, designated open locations away from settlement were necessary for the metal working due to the sparks, toxic fumes and exceedingly high temperatures required (Ehrenreich 1985).

The supernatural affordances of metallurgy will be further explored below in Section 7.3.2. This chapter will continue to examine the role of copper alloy and iron metallurgy as signative and pragmatic within social contexts and as important in identity formation throughout the Iron Age of south-east Scotland by examining their biographies of appropriation, use and deposition. Relationships to other technologies in the previous chapters will also be highlighted.

### 7.1.1 Evidence for copper and iron in the south-east Scottish Iron Age

Comprehensive studies of the Late Iron Age metal objects from southern Scotland with an emphasis on Traprain Law have been carried out by Burley (1955-56), Curle (1913,

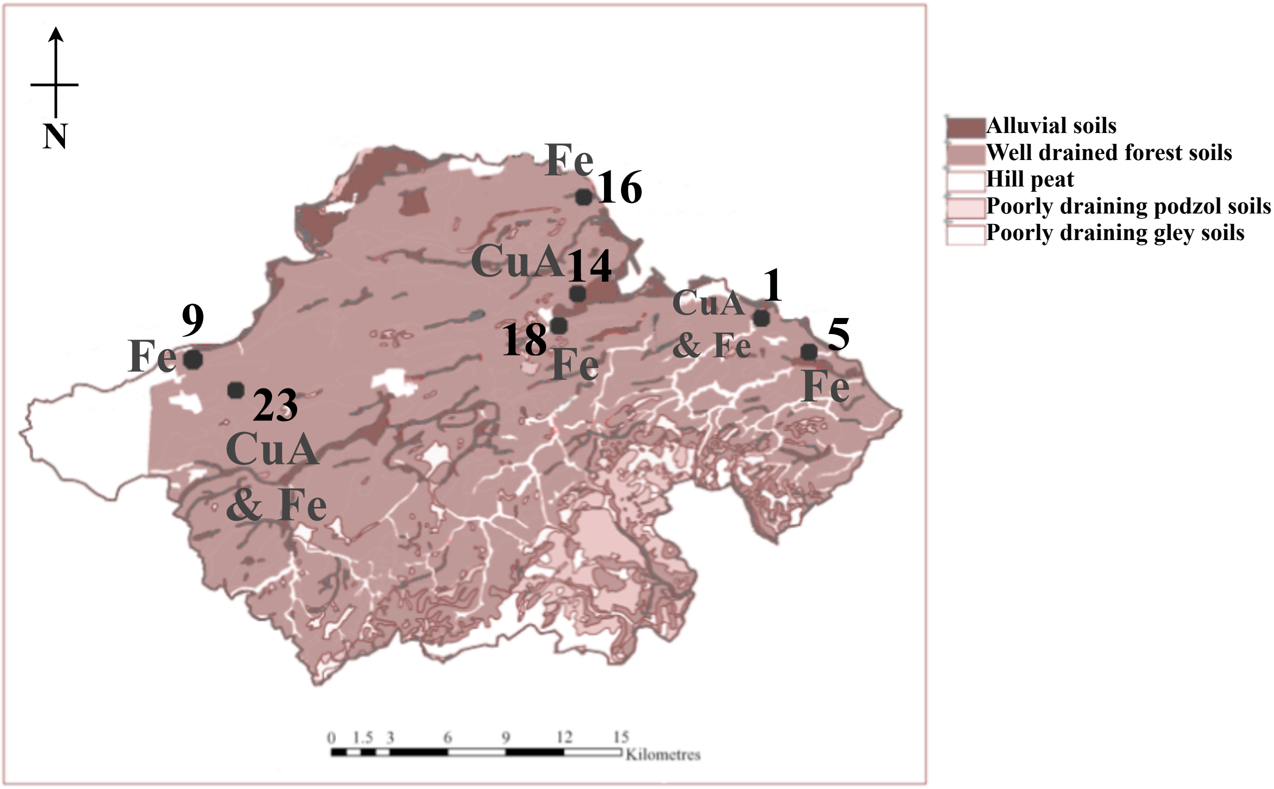



**Fig.63:** The excavated sites in East Lothian (see Figure 1) with evidence for copper alloy working and iron smelting in their assemblages. (Map: R Reader and M Maxwell)

1932), Stevenson (1966), Robertson (1970), and most recently Hunter has updated and placed this assemblage within its local contexts (2001, 2009). The rest of the available evidence from East Lothian has been compiled and presented in Appendix 8. All of these sites have well published catalogues except for St Germains from where the finds were stolen from the site hut during excavation before they could be analysed (Alexander and Watkins 1998). The data for this chapter comes from the published assemblages and Broxmouth's iron and copper alloy assemblage (Appendix 1) which were examined first hand by this author. Additionally, Blakelock and McDonnell, and Hunter, Kirk and Dungworth have carried out metallurgical analysis on a selection of iron and copper alloy objects and slags from Broxmouth (McDonnell and Blakelock in prep. 2013, Kirk et al in prep. 2013).

Until now, the Late Iron Age metal assemblage from Traprain Law has been the topic of many papers positioning the site at the centre of Votadinian political relations, principally because of its access to fashionable continental La Tène and Roman material culture (Burley 1955-56, Curle 1913 and 1932, Stevenson 1966, Robertson 1970, Jobey 1976, Hunter 2001, Armit et al 2006). Because Traprain Law undoubtedly exceeds all other excavated southern Scottish Iron Age sites with its wealth and breadth of exotica from the Late Iron Age, including an array of decorative metalwork, this site is therefore envisioned as the dominant player in the social system (Hunter 2009: 156). Traprain Law's wealth of metal and related objects fall into two periods; the Late Bronze Age (44 copper alloy objects and 14 clay moulds) and the Late Iron Age. Both copper alloy (c. 364 objects) and iron (c.285 objects and 56 clay or sandstone moulds, not including three possibly medieval objects) are characteristic of the Iron Age, most probably towards the end of this period (Burley 1955-56, Jobey 1976). The assemblage is indicative of wide contacts; Hallstatt and La Tène influences are evident in the copper alloy assemblage and 'Roman' objects include dolphin, dragonesque, bow and penannular brooches, armlets, horse fittings, fragments of bowls, toilet articles and a folding spoon (Robertson 1970: 217, 226). There may be a hiatus in the occupation of this site in the intervening Early and Middle Iron Age period as Burley tentatively suggested in her analysis of the metalworking assemblages (Burley 1955-56). Recent excavation and dating strategies supports a change in use of this site for the Early and Middle Iron Age, when perhaps the Law was not permanently occupied but was a site of occasional gathering (Armit et al 2006, Hunter 2009: 155).

In light of recent excavations in Traprain Law's environs, an emerging picture of small scale hierarchies across the East Lothian Later Iron Age in the shadow of Traprain has emerged (Hunter 2009). Hints of status differentiation, it is argued by Hunter (ibid.), were linked to the evidence for iron-working which took place on only nine excavated sites (including Broxmouth) out of 32 in Iron Age East Lothian, and is indicated in the Late Iron Age by distributed access to certain categories of decorative metalwork and exotica (mainly amber, coral and La Tène brooches, some of which are also found at Broxmouth) (ibid.: 145, 148). Specifically in East Lothian, smithing is found on eight sites, whilst securely dated evidence for iron smelting is only found on only two (Broxmouth and Fishers Road East) suggesting a level of specialisation of the latter (ibid.: 148). Notably, evidence for working iron is not found at Traprain Law. If we turn our focus to the human and material relationships involved in working iron, therefore, the dominance of Traprain Law in Iron Age society may have to be re-thought.

*Preservation and taphonomy*

The presence of metalworking evidence is not synonymous with the presence of metal objects in site assemblages; this is the case, for example, at Edin’s Hall, Fishers Road East and Newmains (Appendix 1). This means that when material was worked on site it was not necessarily deposited on site, indicating that both copper alloy and iron objects were involved in networks of social relations beyond their place of manufacture. Table 1 in Chapter 1 shows the number of iron and copper alloy objects recovered in each phase at Broxmouth (a total of 30 iron objects and 19 copper alloy objects from stratified deposits or of Iron Age morphology were found). When this is compared to the phased evidence for debris (smelting or smithing slag, furnace walling, crucible fragments) from copper alloy (Phases 2 and 4) or iron working (Phases 1, 2, 3, 4 and 6) it is evident that the metal objects manufactured at Broxmouth were not deposited on-site and it could be that they were exported or recycled. In particular, there is no deposition of iron objects in Phase 1, and no iron or copper alloy objects Phase 3; though this is based on a small number of recovered objects and there are some in Phase 3/4.

The poor visibility of iron and copper alloy in the archaeological record of the East Lothian Iron Age (Figure 63) is also in part due to bad preservation (Dungworth 1997: 908) and structured deposition away from excavated settlement sites (Section 7.6). Finds of copper alloy are more common, perhaps due to their resistance to corrosion in soil and water (Tylecote 1986: 40). Evidence of *in situ* working is rare because simple single use furnace structures were likely used, while debris was almost always deposited in secondary midden deposits in ditches or spreads away from the site of manufacture. Smithing in particular does not leave much trace except for hammer scale. It is also more difficult to identify evidence for copper alloy smelting because the materials required for smelting probably perished during the process; little waste was produced, and it could have taken place on the domestic hearth (discussed in Section 7.3.1) .

Limited full-scale excavations and the failure to date contexts in which metal objects and metallurgy debris were directly found, or of contexts which seal this activity, make it difficult to refine a chronology for the nature of copper alloy and iron working in the region. In this light, Broxmouth's well dated assemblage of tapped and bloomery iron smelting slag, iron and copper alloy objects is an important contribution, especially in relation to the fact that skilled iron-working was definitely taking place at this site from the 5th century BC and copper alloy from the 4th century BC.

*Iron working evidence*

Evidence for iron smelting and smithing is found episodically throughout the Iron Age and is apparently non-discriminatory according to site type (Figure 63). Broxmouth has the earliest evidence of iron smelting in south-east Scotland (based on the presence of tapped and bloomery smelting slag), from Phase 1 continuing into Phases 2, 3, 4, with a possible hiatus in Phase 5 and starting again in Phase 6. From Broxmouth a selection of slag and seven iron objects including three bars (GGK Phase 4, FTV Phase 6 and FFH Phase 6), which are unfinished objects from an early stage in the metalworking process, were studied using Scanning Electron Microscopy (SEM) (McDonnell and Blakelock in prep. 2013). The results support the on-site roasting and bloomery smelting of locally available ferritic and phosphoric iron ores (with the addition of one sample which had utilised a carbon steel ore) and their subsequent smithing and cold working in at least one case (a diamond section ring from Phase 3, FBN/ no.548). The analysis of slag showed high levels of manganese and barium sulphides, which comparatively accords with all three bars which showed similar compositions of high sulphide and manganese levels, but were low in phosphorus and silica which were presumably removed during smelting.

Two pieces of slag were analysed from Phase 1 contexts with associated metallurgical material in the area of Structure A, including cinder (in the primary structure) and possible parts of furnace wall (FXW and GIN) (found in the later re-build of the structure) which were found near two pieces of tap slag (FUP and FUY) and a possible clay mould (GOS, now missing) in contexts associated with the later stages of this structure. The analysis revealed that there was little free iron oxide in the slag, showing that the majority of iron remained in the ore being smelted, indicative of an efficient and controlled process. The earliest object analysed was a knife from Phase 2 (GDN), found to be a moderate carbon steel but which had the same percentage of manganese as the other objects from various phases and the slag analysed from Phase 1, showing it too was probably made on site.

In Phase 6, a section of furnace wall (EBW) with possible tap hole was found in a pit in the yard area next to House 1. The pit itself was not dated, but may be representative of the latest Iron Age activities occurring at Broxmouth. The inner surface of this furnace was black and was therefore fired in a reducing atmosphere. It is not clear whether the furnace walling was found *in situ*, but its location in a pit in which ash and charcoal were also deposited near the interior yard area suggests that it may be the primary site of working. In the same pit fragments of Type 2 pottery were found (EGV) and a particularly finely tempered sherd unlike either Type 1 or Type 2 (no code, now missing). The fine fabric would have been able to withstand high temperatures perhaps for use as an artefactual ceramic associated with metal working. In the upper fill of the pit was a broken fragment of an upper rotary quern (DYL) perhaps placed there as a closing deposit. The majority of iron objects from Broxmouth come from this last main phase of activity and are mostly found in contexts from the interior associated with the houses. A possible graver tool (CFA) analysed by McDonnell and Blakelock (in prep. 2013) from Phase 6 was particularly high in phosphorus. Phosphoric iron is harder, tarnish resistant and polishes well to a bright luster. This object is indicative of skilled hot forging, since phosphorus makes iron brittle during cold working (ibid., Tylecote 1986: 144). This analysis (McDonell and Blakelock in prep. 2013) is, therefore, especially important for understanding the efficiency of the bloomery process which took place onwards from Phase 1 (705 - 455 cal BC) at Broxmouth.

Elsewhere in south-east Scotland, iron smelting took place at Fishers Road East from approximately the 1st century BC to the 2nd century AD, although no iron objects were found at this site. The evidence for iron working from here is similar to the bloomery smelting process practiced at Broxmouth (Lowther 2000a: 138-140). Iron smithing slag was also found at Fishers Road East in a different area from the rest of the metal working evidence, but in a deposit which still clearly respected the main enclosure layout. Questionable radiocarbon dates were retrieved from this area dating to the early medieval period (Adams and Philip 2000: 120, 127). It is thought that in both cases the dated grains were most likely intrusive and the deposition of the smithing debris more likely happened before or around the 1st century BC (ibid.: 118-121, 132). Iron working slag was recovered from Newmains, but it has not been analysed or published.

In East Lothian, most sites produce intermittent evidence for smithing suggesting it was a more ubiquitous practice. For example, there is no evidence for smelting at Fishers Road West, but iron smithing, forging and welding did take place. A plano-convex smithing hearth bottom was found in the late fill of the Phase 3 ditch which is unfortunately not well dated, but according to stratigraphy is probably from towards the end of the 700 cal BC to AD cal 200 date range (McCullagh and Mills 2000: 26). At Dryburn Bridge iron smithing slag was recovered from both the Phase 3 and Phase 4 ditches at this site (400 cal BC to AD cal 100). Additionally, a tiny amount of *in situ* smithing slag was recovered from secondary or unphased contexts at this site, but this was not analysed (Heald 2007: 81-83). At Phantassie a possible quenching tank which could be used for either copper alloy smelting or iron smithing was found in the same structure in which an iron linch pin with copper alloy inlay was found (Lelong 2007: 170).

*Copper alloy working evidence*

Importantly, there is no secure evidence for iron smelting or smithing at Traprain Law, but it is likely that copper alloy smelting took place here from the Late Bronze Age/ Early Iron Age as clay and sandstone moulds, and crucibles were found in Curle and Cree's earliest excavated levels (Cree 1923: 197, 203). Copper alloy working evidence has not yet been recovered from securely dated contexts at Traprain and so we do not know how far this continued into the Iron Age. Elsewhere, copper alloy working continues from the Late Bronze Age throughout the Iron Age in East Lothian. Casting debris and other associated evidence is present at Broxmouth from at least Phase 2 (Section 7.4.2). Energy Dispersive X-Ray Fraction (EDXRF) analysis on three crucibles and a tuyère from Fisher's Road East indicate their use in copper alloy working. The analysis found no zinc in the alloy composition, therefore suggesting that the copper alloy working is pre-Roman in date or that this site did not have access to Roman copper alloy (Lowther 2000a: 138). A tuyère/ crucible and mould fragment from the later phases of Iron Age occupation at St Germains are at least indicative of small-scale metal working, however they have not been scientifically analysed (Alexander and Watkins 1998: 249). A copper alloy draw bar used for making wire was found at Phantassie, which still had shavings of pure copper and brass adhering to its holes (Hunter 2007: 178 box 7.4), however this may only indicate that secondary processing of copper alloy took place here.

Cut-marks from metal tools are found on worked bone and antler at five sites (Broxmouth, Dryburn Bridge, Archerfield, Ghegan Rock and North Berwick Law) and as sharpening grooves on some querns from three sites (Broxmouth, Knowes and Traprain Law) (Chapters 4 and 5); from Broxmouth the evidence for possible metal tool sharpening grooves are found on five rotary querns all of which are from Phase 6, excepting one which is unphased. There are chop-marks and incisions from the use of metal blades of varying size on the worked antler beams and tines from Phase 1 through to Phase 6 at Broxmouth.

**7.2 Appropriation; materials, ores and fuels**

Both copper alloy and iron working require a range of materials; fuel, ores or objects as a source of metal, and a furnace or insulated fire pit. Moulds and crucibles made of ceramic or stone are also required for copper alloy smelting. Around 40kg of clay is required to line a furnace suitable for iron smelting (Salter and Ehrenreich 1984: 147) and clay is also required for tuyères. In secondary processing of the iron bloom water and other viscous liquids can be used to deliberately harden the metal. Most of these materials were locally available in their raw state and were already being used in other activities (pottery manufacture, agricultural processing, working of antler and bone and pigment preparation), excepting the charcoal (if used for fuel) which must have been specially produced and the tin for making bronzes which originally came from south-west England.

*Iron ores; prospecting, gathering, trade and recycling*

Iron ores were readily available from a range of sources, even occasionally including meteoric iron (Hingley 1997: 10, Salter and Ehrenreich 1984). Ehrenreich recognises the increasing use of local sources in the Middle Iron Age in southern Britain rather than geographically specific sources from, for example, Devon-Cornwall (Ehrenreich 1994: 17). However, due to a lack of trace element analysis of iron objects, their slags and ores in Iron Age southern Scotland, we cannot be sure of ore origin. Nevertheless, the high phosphorus content and presence of sulphides in the analysed objects and slags from Broxmouth indicates the use of bog ore (Hall and Photos-Jones 1998, McDonnell and Blakelock in prep. 2013) which was probably locally available. Bog iron forms in bogs, marshes, moist shallow depressions and in lakes, and was much more extensively available in prehistory (Hall and Photos-Jones 1998: 58-59). When a large quantity of iron is present it discolours the river or the spring which emerges from the bog, and stains rocks a rusty orange-yellow red (ibid.: 55). The presence of bog iron can also be detected by the sulphureous smell it emits as it oxidises, and residues which form an oily film on the water surface. Iron will also stain the soft clay/soil red (Williams 1810: 328-329). Peat bogs are known in Midlothian and West Lothian, and in the district of Haddington, East Lothian (Smith et al 2008). Carbonate iron ores (chalybite and siderite), which are yellowish-brown crystalline rocks, may also have been locally available (Ehrenreich: 1985: 16, Smith et al 2008) from the geological horizons which also include sandstone, limestone and shale in East Lothian (Chapter 5, Section 5.2.2).

It is possible that both hematite and ironstone were exploited as a source for iron, although ironstone has a much lower iron content. The local availability of hematite and ironstone has already been discussed in Chapter 2. Nodules of brown-red hematite and ironstone are found in the Traprain Law assemblage some of which is firecracked. Another firecracked ironstone convex disc was found at Hownam Rings, Roxburghshire. In the 19th century hematite was extracted at Skid Hill Quarry (now disused) in the Garleton Hills (Canmore site number NT57NW 9, Groome 1882: 237) and today can be found washed up as nodules on the local East Lothian coastline (Figure 37 in Chapter 5). Hingley (1997: 10) argues that nodules of iron ore may have been gathered after ploughing or from the ground surface, although this is based on the iron rich areas of Cornwall, south-west England. In East Lothian, iron ore nodules may have been gathered from the shores of lakes, rivers or the coast. Additionally hematite forms as the result of volcanic activity and therefore it may have been extracted from the volcanic plugs of Bass Rock, North Berwick Law, Traprain Law and the Garleton Hills.

Once ores like these have been smelted for the first time, the slag produced from the inefficient bloomery process could be re-smelted (Ehrenreich 1984: 151). Despite this inefficiency and poor iron quality according to modern standards, the exploitation of ores with large amounts of impurities may have in fact been regarded as valuable and resourceful since they could be worked more than once.

Another important source for iron was the circulation in bars, although these are found at only three excavated Iron Age sites from south-eastern Scotland; Broxmouth, Hownam Law (Piggott 1948: 219, fig.12) and Phantassie (No.391 in Hunter 2008a). These sites all have evidence for iron smithing, and so it is likely these sites were the recipients of iron bars which were smelted at different sites. This pattern of evidence accords with the greater number of sites which have evidence for smithing (approximately one third of sites) rather than for smelting (one quarter of sites).

There are hints that worked stones with ferritic inclusions may have even provided iron ore for working. Attempts to extract larger iron inclusions from sandstone objects was seen on a cobble tool from Broxmouth (EEY), which has localised pecking around its ferrous inclusions, and a quern fragment from Dryburn Bridge (DB 79 561) where the worn grinding face was pecked after use, including localised pecking around one of three large ferrous inclusions.

Recycling was another important resource, discussed further in Section 7.5.1. The metallographic analysis of a bar fragment (FTV) from Phase 6 at Broxmouth showed that it was manufactured from a heterogenous bloomery iron or even two different irons (one ferritic, the other a steel) (McDonnell and Blakelock in prep. 2013), which may suggest re-use of ore gathered in the base of a furnace from more than one smelt or scraps of metal. There is also evidence that scraps of iron objects were deliberately collected to be re-smithed. Many broken fragments of iron objects were found at Phantassie including shanks, an ard, a bar and knife (Hunter 2008a), and also at Broxmouth (Appendix 2) including a deliberately cut iron staple (finds code CEJ) (Table 15).

*Copper alloy ores; prospecting, mining, trade and recycling*

Deposits of copper are known from the Lammermuir Hills in East Lothian (Dungworth 1986: 11-12, table 7 and table 6) and historically copper ores were mined at Currie in

Midlothian (Williams 1810: 369); these were certainly exploited during the Iron Age. Broxmouth's siting on a limestone outcrop may be significant since limestone geology has historically been a rich source for copper ores (Williams 1810: 303). There is good evidence that copper extraction in the Iron Age took place only 1.4 km away from Edin's Hall broch, Roxburghshire, where there is a disused copper mine (Hunter 1999: 338-339). Two copper alloy plano-convex discs (one is now lost) were discovered stacked together within the broch and the disc which survived is a considerable weight of 20.260 kg; only 0.8-1.8 kg of bronze is apparently needed to make a massive armlet (Hunter 1999: 338-339). Furthermore, trace analysis of this disc was representative of the primary smelting of copper ore from a local origin with a relatively high lead content, which strongly suggests that the substantial amount of copper originated from this local mine (ibid.).

It is also suggested that local riverine or outcrop sources for copper ores were important (Timberlake 2001: 184). These will have been more readily visible in the Iron Age as a result of tree clearance, whereas today they are buried beneath eroded rock faces or built up peat, or even completely eroded away (ibid.: 185). Yellowing grass and natural tree clearings caused by the infertility and pollution of soils are an indication of underlying copper mineral deposits (Timberlake 2001: 183). Copper ores can stain their surrounding sandstone a green colour, which would have been immediately noticeable (Williams 1810: 302). Green malachite, red and white lead oxide minerals, white hydro-zincite, black manganese and red-brown iron ochre or hematite are also indications of the presence of green-blue copper ore. These could have stained cracks in geological outcrops which could have been seen from over 1 km distance (ibid.). Williams in the early nineteenth century wrote that "it is a common thing in some mining countries for the miners to go ‘a-shoading’ [looking for bog or eroded ore out of the ground]...they will traverse rivulets, gullies, scars and other places where the surface of the ground is broken...they will even examine newly ploughed land and molehills” (1810: 307). People in the Iron Age will have probably hunted for and harvested copper ores from the landscape following these clues.

A range of copper ores were, therefore, locally available in East Lothian, but sources of tin required for making bronzes are not known from Scotland. Tin bronzes with a low zinc and lead content were the most commonly used alloy in the northern British Iron Age (Dungworth 1996: 401-402). X-Ray Fluorescence (XRF) analysis suggested that the tin component for copper alloys was controlled and that recipes were followed by Iron Age smiths, based on the observation that tin was found in higher quantities in cast than in wrought copper alloy objects (Dungworth 1996: 401-402). Indeed, there is evidence for the deliberate use of tin as an alloy in the objects analysed from Broxmouth and Knowes (Section 7.3.3). Tin ores are only found in specific locations, and in the Iron Age were either imported or traded over long distances into south-east Scotland probably from south-west England or the Continent (Northover 1984: 126-127, 129), and thus were involved in extended networks of engagement over space and time.

Lead is a common impurity in copper alloy ores, but was also deliberately added to copper alloys to aid casting. Lead melts at a much lower temperature than copper (c. 350°C) and could have been extracted by roasting the ore separately or in the furnace first before processing the remaining copper ore.

The appropriation of tin through extended trade networks may, however, have been episodic, as another main source was likely the recycling of bronze scrap and objects already in circulation since the Bronze Age or objects manufactured in southern Britain or imported from Ireland and the continent during the Iron Age (Northover 1984: 127) (Section 7.5.1). Dungworth's analysis of wrought copper alloy objects from Iron Age sites in northern Britain showed a near equal distribution in the tin content, argued to be indicative of recycling of scrap bronze with variable tin contents from different geographical regions which would eventually have the effect of standardising the bronzes produced (Dungworth 1996: 402). Additionally, by the Late Iron Age the melting down of Roman brass objects (copper alloys with a high zinc component) in northern Britain is documented (Dungworth 1996: 408-410). Copper alloys with a high zinc component were found at Broxmouth from the Late Iron Age (Kirk et al in prep. 2013).

**Fig.64**: An unfinished rotary quern from Newmains, East Lothian, broken across its perforation (NO CODE, entry number 73 in 'worked stone' in Appendix 2). The object has been re-used as a mould, probably for copper alloy working. There is also a small pecked cup just below the mould. (Photograph: M Maxwell)

Another probable source was from the trade in copper alloy ingots, discs or objects. In addition to the discs recovered from Edin's Hall broch, Roxburghshire, longitudinal bar shaped moulds 35 cm to 38 cm long, 2 cm deep and 1 cm wide were found carved into blocks of old red sandstone at Traprain Law. A very similar mould 30 cm long, 1.5 cm deep and 1.5 cm wide was found on an unfinished rotary quern fragment from Newmains (Figure 64).

The recycling of copper alloys of Roman or continental origin in the Late Iron Age explains the composition of some objects found in late contexts on native sites in northern Britain which have a relatively high zinc component (greater than 3%) (Dungworth 1996, 1997). Zinc as a deliberate alloying component only appears at the end of the 1st century BC in northern Europe and the 1st century AD in southern England (Dungworth 1996: 410). At Broxmouth, zinc appears in four out of the six objects analysed made of copper alloys from Phase 6 (Kirk et al in prep. 2013). XRF analysis showed that very pure alloys of copper and high-zinc brass adhered to the draw bar used for making wire from Phantassie, and thus is further evidence of using recycled metals from Roman sources (Hunter 2007b: 178 box 7.4). In addition the broken linch pin discovered at Phantassie has a *terminus ante quem* of 40 cal BC- cal AD 130 (Lelong 2008c: 170). Linch pins are normally dated to 3rd or 4th century BC (Hunter 2007: 170 box 7.3) and so this one was probably curated, before its deposition much later, while its location in a probable metalworking workshop (Lelong 2008: 170) could be said to show the deliberate curation of this object for recycling.

Recycling may not have been limited to higher quality metals of Roman origin. For example, the spiral finger ring analysed using XRF from Knowes was made from a leaded gunmetal; probably a combination of leaded bronze and brass resulting from whatever scrap metal was lying around (Dungworth 1997: 904-906). Additionally, packages of copper alloy sheet described as 'scrap' were found at Knowes, part of which has been patched and some edges clipped (SF 212, Hunter et al 2009: 139-140). A similar package of sheet fragments was found at Dryburn Bridge (Hunter 1997: 78), and bent and clipped fragments of copper alloy sheet were also found at Newmains (unpublished). The high proportion of fragmented copper alloy objects at Broxmouth (Appendix 1, and Table 15) along with potential evidence for copper alloy working at this site may also suggest the curation of scrap for secondary working. Furthermore, it was possible that not only copper alloy scrap was recycled, but also the waste from the smelting process itself. The inefficiency of the copper alloy smelting process produced the by-product 'matte' which could have been re-smelted in order to retrieve the copper not extracted from the first smelt (Section 7.4.2).

The above illustrates that Iron Age communities in south-east Scotland were active participants in a widespread tradition of copper alloy working. Tin was acquired episodically through extended long distance networks to be added to locally mined copper ores. Widespread traditions were also locally interpreted, literally melted and formed again through the practice of recycling old objects, scrap, in the Late Iron Age often of Roman origin. Evidence for copper mining and the production of ingots for trade is limited to a few sites, suggesting the specialist and controlled access to copper ores.

*Fuel*

The fuel required for iron and copper alloy smelting must be able to burn for a long time at temperatures above 800°C for iron smelting and 700°C for copper alloy smelting. Dung and dung cakes, coal, charcoal and bone could have been used (Northover 1984: 138, Tylecote 1986: 223-227). It is possible that wood was also used (heartwood, sapwood or bark) but is considered to be more suited to lead-smelting which requires lower temperatures maintaining oxidation (ibid.: 223). Shells were not likely to have been used for fuel as they would raise the temperature too high for the type of non-ferrous copper alloy working and bloomery iron process (Tylecote 1986: 46) which was practiced in Iron Age East Lothian (Section 7.4.2).

At Traprain Law two hearths found beneath the Cruden Wall were associated with deposits of charcoal and unburnt cattle bones (Cruden 1939: 54). Next to these was a deposit of 50 pieces of carbonised twigs of hazel with a few fragments of oak and willow which were 'neatly cut into small sections' (ibid.). These are all long-burning tree species. At Phantassie, the workshop structure was infilled with a deposit of cherry charcoal (another long-burning species), in which a possible quenching tank for metal working and the iron chariot linch pin was found (Lelong 2008: 170). Carbonised birch, alder and hazel are also recorded in various midden deposits at Phantassie, including the midden into which the iron draw bar was pushed (Lelong 2008: 175). Indeed, charcoal was commonly included in the midden deposits which infilled the ditches and structures of other excavated Iron Age sites in East Lothian. At Broxmouth, midden deposits in the East and south-west Entrances include frequent charcoal fragments (not identified to species). Similarly, at Fishers Road East, charcoal was also found in the fills of ditches, but again none of it identifiable to species (Huntley 2000: 169).

Dried turf, alder or birch wattle and soot-penetrated heather may have been another source of fuel. The dark greasy character of some of the midden deposits recorded at Broxmouth (for example at the south-west Entrance) and Phantassie indicate the decayed presence of organic matter, some of which may be from fuels of wood, peat and heath turf or from burnt dung as recorded in a ditch separating two enclosures at Fishers Road East (ibid.). The possibility of using dung in pottery manufacture has been noted in a previous chapter (Chapter 6).

The fuels used must be dry and as a result smelting iron or copper alloy was perhaps conducted seasonally (Giles 2007: 398). Additionally, the organic and carbon rich fuel residues were probably deliberately added to midden which in turn were used as fertilisers on the field. The addition of ash in particular will have helped reduce the acidity of the East Lothian soil. The use of dung, and deposition of fuel debris more generally in midden would therefore have linked metallurgy with potting, the agricultural cycle and animal husbandry.

Mineral coal is located in extensive shallow deposits to the west of East Lothian and into Midlothian (Smith et al 2008), and historically southern Scotland is one of the most productive areas in Britain for producing coal (Hannis et al 2008). It is possible that these mineral coals may have been exploited from surface deposits by Iron Age people. At Fishers Road East some clearly burnt coal fragments were recovered mostly from the same contexts as the metal working debris (Lowther 2000a: 140). Coal is recorded in section and in various contexts across the site at Broxmouth, but it is likely to be a natural inclusion as there is no evidence of it having been mined or deliberately gathered. Nevertheless, its ubiquitous availability suggests that coal may have been harvested from the local landscape, perhaps after tilling the soil.

Additionally, shale or cannel coal was available for use as a slow burning fuel, although no fragments from Iron Age settlement deposits in the region show any evidence of deliberate burning. Their availability along the coast of East Lothian for artefact working has been discussed in Chapter 5, but despite their ability to burn for long periods of time, shale and cannel coal give off an unpleasant smell when burnt which was a possible reason for avoiding their use as a fuel.

In summary, there is evidence that charcoal and coal were used as fuels, appropriated from semi-managed woodlands and tilled from the East Lothian soils respectively. A range of organic fuels (probably agricultural by-products) suitable for copper alloy and iron working were also probably used, evidence for which only rarely survives.

## 7.3 Perceived affordances

### 7.3.1 Signative

The technology of copper alloy and iron working, the resulting objects' colours, smell and even sound bring to the fore themes of danger, fertility and the supernatural.

*Danger and intimacy*

Both Hingley (1997) and Giles (2007) have been influenced by the work of Herbert (1993), who studied the social context, taboos and rituals which surrounded working iron in African societies. In this and other anthropological works, metal working has been understood as magical, peripheral and dangerous.

The descriptions of the iron bloomery and copper alloy smelting processes which follow are based on the evidence from Iron Age East Lothian and archaeologically informed accounts given by Salter and Ehrenreich (1984), Ehrenreich (1986), Rehder (2000) and Pleiner (2006). Childs' (2000) account of iron working practiced by the Toro of Western Uganda has also been referred to as it technically describes an analogous process to bloomery smelting, using similar materials, equipment and freestanding furnace structures made of clay.

First of all, the iron ore was roasted at a minimum temperature of 800°C in reducing conditions surrounded by a fuel. This helped to expel impurities from the ore to create a purer iron, but even after this impurities remained. The next stage was smelting in a furnace at temperatures of 1100°C -1300°C or higher (Ehrenreich 1986: 22) with large quantities of fuel. Smelting at 1100°C to 1300°C did not melt the iron, but instead created a spongy mass (the bloom) which gathered in the base of the furnace and fluid slag (a composition of waste impurities from the ore) which was tapped off away from the furnace interior. Much smoke and noise was produced during the smelting process, due to the rythmic pumping of air through a tuyère attached to bag (made of leather, hide or animal stomach), which acted like a bellows (Childs 2000: 223). The required temperature was measured by colour changes listed in the table below (after Childs 2000: 221, 227) : the flame/ glow of the fuel developed from a 'faint dark-red-glow' at 550°C to a 'white glow' at 1500°C (Rehder 2000: 12). The iron will have glowed a 'very red, pure red' and 'hissed' when ready, but if it was spoiled will have turned 'very black' (Childs 2000: 221, 227). The tuyère could have acted as a peephole in order to check on these colour changes.

| Temperature | Colour |
|---|---|
| 550°C | faint, dark red |
| 850-950°C | bright red |
| 1050-1150°C | yellowish-red |
| 1500°C | white |

Sparks 'like stars' erupted from the furnace when the iron was ready (Childs 2000: 224), at which point the smelt was ended. Bloom was then selected for smithing; depending on the efficiency of the process, some of the bloom could have been re-smelted to obtain more workable iron. Smithing involved repeated heating until malleable and controlled hammering, squeezing, bending, shearing or drawing to remove as much of the remaining slag as required to create iron ingots or objects. Finally artefacts were finished by grinding and sharpening with files or a whetstone; many of the whetstones from the East Lothian Iron Age have metal staining which suggests they may have been used in this way (Chapter 5).

The locational requirements and closed nature of the iron smelting process meant that there were restrictions regarding who could take part, probably controlled by taboos. Smelting required good weather or shelter, while the obvious risk of fire meant that it must have been carried out in a controlled atmosphere. Smelting need not necessarily have been carried out far away, however, but could have been carried out within the settlement shielded by vegetation or man-made structures, as documented in 19th century Karagwe metalworking (Reid and MacLean 1995: 150). The possible *in situ* bowl furnace and iron smelting debris from Phase 1 at Broxmouth were found in midden deposits and the associated yard area of the third and final refurbishment of a structure, in which were also found fragmented saddle querns, cupped stones, used cobble tools, and worked bone and antler debris (Figure 9). This suggests that iron smelting was carried out within the settlement area, but perhaps just before the abandonment of this structure when it no longer functioned as a domestic house.

In contrast to iron bloomery smelting, copper alloy ore smelting was perhaps a more accessible technology, not requiring shelter and specific super-structures. The first stage involved roasting the copper alloy ore in order to increase its friability, porosity and ability to reduce. Lead could also be extracted at this stage if required. This most likely took place in the open as much white smoke was produced, and arsenic and sulphur dioxide were often emitted; the first will have smelt of garlic and the latter ‘sharp and acrid’ (Cook et al 1991: 14, Rehder 2000: 115). This process did not have to be done if the copper ores were weathered and had been exposed in the open before being gathered, as the sulphur content would be much less as a result of natural processes of oxidation. The ore was then smelted in a crucible, kiln or furnace in a reducing atmosphere packed with fuel. The temperatures required of over 800°C could have been obtained on a domestic hearth with the help of bellows (Box 5, Chapter 6).

Temperature was monitored using colour changes of the flame from dark red to white, in the same way as iron smelting. It has also been noted in specific reference to copper alloy smelting that using the human lungs as bellows by physically blowing into the furnace can be particularly effective (Rehder 2000: 76). Human breath is much reduced in oxygen, containing two-thirds less oxygen than ambient air; this strenuous method was perhaps valued as a way in which to control the reduction process (ibid.). Constant supply of human breath would have allowed temperatures of 1100°C to 1300°C to be reached, enough to smelt copper and its alloys into prills whilst expelling a moderate amount of iron impurities from the ores and minerals if present (ibid.).

The smelt produced layers of slag, matte (containing copper sulphides and some iron) and copper. The matte could have been treated as an ore and re-roasted and smelted again but this time using a high silicate flux (for example sand). The copper alloys produced were in the form of molten prills and raw metal fragments. In order to obtain alloys with less impurities the copper alloy was re-melted in a crucible on a hearth packed over with fuel or in small furnaces at a temperature of c. 1000°C. To deliberately create alloys the additional ingredients (such as tin) were directly smelted in the same way, with the addition of iron oxide fluxes (for example ironstone or hematite) and limestone and/or sand. The molten copper alloy would then have been cast in moulds to make objects, then filed and polished. This potentially required a complex tool kit of hammers, chisels, anvils, compasses, engraving tools, files and polishing stones. In addition to polishing stones found at most Iron Age sites in south-east Scotland (Appendix 2), four possible iron gravers or points for fine working from Broxmouth, and the use of a compass tool on an antler drum has been identified at Broxmouth

(Maxwell et al 2012 included in Appendix 10, Chapter 4). These artefacts are absent in the other Iron Age artefact assemblages from East Lothian.

The many stages in the copper alloy smelting process meant that this technology was perhaps regarded as alienable, involving many individuals in the community, particularly given that it did not necessarily require specific super-structures, involved lower temperatures, produced less fireworks and fumes, and ultimately could have taken place on the domestic hearth. However, extensive exposure to the poisonous impurity lead over time will have delayed female puberty, affected female fertility increasing the chance of miscarriage, caused aneamia and brain damage which would have marked out the individuals involved in copper alloy working as different, and perhaps meant that copper alloy working was only practiced episodically.

*The individuals involved in copper alloy and iron smelting*

The iron bloomery and copper alloy smelting processes were therefore performances, involving spectacular colour changes, danger and intimate know-how. Smelting iron, and copper alloy ores, was a smelly and sensual experience. Bodies sweated, hair was singed and eyes were blinded from the smoke and fumes. It was also a highly dangerous process. For these reasons, metal working has often been considered to be a restricted skill, and access to the furnace strictly controlled by a range of cultural taboos, and siting in peripheral locations (Budd and Taylor 1995, Giles 2007, Hingley 1997). This likely meant that it was a technology imbued with power, involving only selected individuals, who may have been marked out from the rest of the community because of their burnt skin, singed hair or blindness from the smoke and fumes.

There have been many ethnographic studies on the practice and cultural taboos of iron working across Africa (Childs 2000, Herbert 1993, Schmidt 1997). The Toro of Western Uganda smelt iron using a bloomery process which, although taking place in a different culture, time and place, is technically similar to what we know of Iron Age smelting in East Lothian (Section 7.4.2). An ethnography conducted by Childs (Childs 2000: 199-253) recorded conversations with a Toro iron worker known as Adyeri, who talked about the smelt as being punctuated by events of sacrifice, sex, dancing and song.

Adyeri explained that when a source of iron ore was discovered a sheep would be slaughtered in front of the whole community as ‘an offering to the ore...The importance

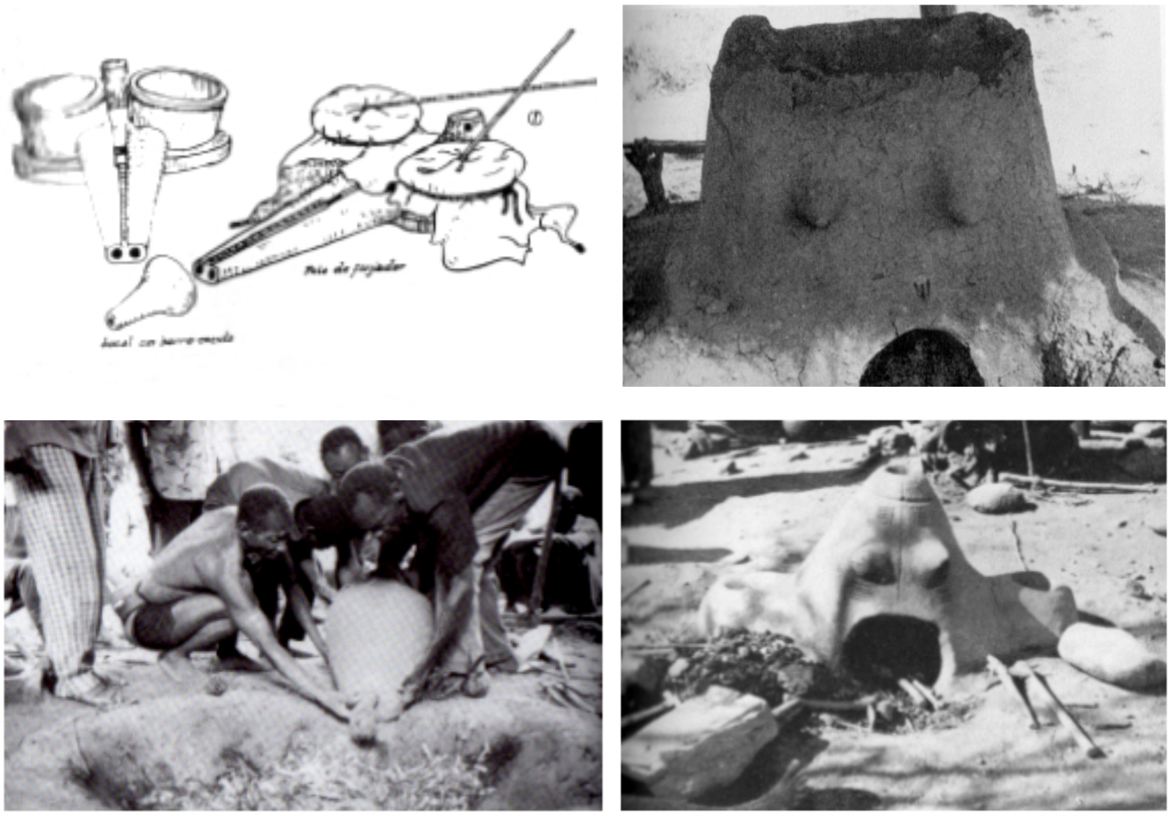


**Fig.65:** Diagram and photographs of African iron bloomery smelting and equipment. *Top Left*: Chokwe, southern Lunda, bellows. *Top Right:* Chokwe, southern Lunda, furnace. The Chokwe word for furnace is *lutengo* which also means vulva. *Bottom Left:* Men putting the tuyère into the furnace, Zaïre, 1989. *Bottom Right:* Shona, Bulawayo, reconstructed furnace. (All images and photographs from Herbert 1993, fig.5, fig.20, fig.21, fig.26.)

of why they had to slaughter a white sheep was because, if they did not, the ore would die. The ore wouldn't come out. They estimated that something that is white is what is good. The iron that will come out will be white...That is why they always slaughter white sheep' (Adyeri's words in Childs 2000: 205). It is perhaps significant that the importance of the colour white echoes the white glow of the flame when the maximum temperature of the smelt was achieved. The skin of this sheep would then be worn as protection during the mining, smelting and forging and would also be used to make the bellows. Additionally, women, particularly those who were menstruating, would be banned from the mine and also from the smelt during crucial stages. Before the smelt the ironworker would have sex with his wife, but during the smelt this was banned to avoid failure of the task. Two bellows were used and they were gendered one female and the other male, the latter was given clay male genitalia. These bellows were regarded as the creators of wealth in the form of a wife (which equalled the cost of one iron sickle), a goat, a cow and other things. Before the smelt another sheep is sacrificed, the blood sprinkled into the furnace, on the charcoal and on the men who were bellowing. After a successful smelt there is beer, singing and dancing for those involved. Interestingly, after the successful smelt menstruating women are not banned from entering the forge any longer, since there is no ore (Childs 2000: 242). Therefore it is only the ore which is in danger of being corrupted by women, not the artefacts made from it.

This account of an iron bloomery process clearly illustrates the relationships between agricultural productivity and fertility (the sheep), the violence of the creative/ destructive process (bleeding) and creative human relations (sexual taboos), with the technology and outcome of the smelt in Toro belief. These inter-relationships and the sexualisation of metalworking are also brought to the fore in Eliade's description of the removal of the ore from the furnace as “obstetrics” in reference to pre-colonial West African iron smelting (Eliade 1971), and Herbert’s review of African iron smelting and smithing (Herbert 1993). The sweaty bodies and heat involved in smelting meant that it may have been regarded as a form of sexual intercourse. In Sub-Saharan Africa iron smelting furnaces often have recognisable female features in the form of breasts and swollen pregnant stomachs (Herbert 1993, Figure 65).

These ethnographies also frequently stress the inalienability of the iron smelting process, where know-how is only accessible to a few individuals. Individuals may choose to become a metallurgist in some societies, and do not necessarily have to be biologically related to one (Childs 2000: 202), however, once initiated as a metallurgist the transfer of this knowledge to other individuals or to the next generation is tightly controlled and governed by aspirations of productive social relations in the interests of the success of the community (ibid.: 200, Herbert 1993: 27).

The inalienable know-how possessed by the smelters and smiths in the Iron Age to enact a dangerous, creative and spectacular alchemy akin to biological creation is likely to have bestowed them with wisdom. Indeed, in many cultures the wife of a smelter was a midwife and the blacksmith took on the role of healer, for example as was practiced by the Matakam and Dogon in Sub-Saharan Africa in the nineteenth and twentieth centuries (Richards 1981: 231-234). The closed nature of the metalworking process for practical and signative reasons, may have meant that the metallurgists took a central role in creating and directing the future productivity of the community.

*Transformative powers of copper alloy and iron smelting*

As has already been made clear (Section 7.2), dependance on the seasonal availability of fuels, and the prospecting and gathering of metal ores (Hingley 1997) makes a cosmological link to the agricultural cycle. The intimate, dangerous and spectacular technology of smelting which employed the use of heat to change the physical properties of materials has also meant that iron and copper alloy working in classical literature and ethnography is frequently imbued with symbolism linked to everyday concerns of renewal/ transformation, fertility, sexuality, productivity and purification.

Hematite and quartz were classified in classical and medieval literature as stones which melted in fire, often described as 'solidified juices', considered to transgress the ancient categories of rocks and metals (Hoover and Hoover 1950: 2, 545). The metals produced from melting these stones/ores could retrieve their original properties of hardness, though in a different form (Hoover and Hoover 1950: 2). The ability of a hard material to change to soft and then to hard again is the ultimate transformative process. Importantly, in the Iron Age only copper alloys were known to turn to actual liquid substances during smelting, whereas iron ores remained a solid throughout the bloomery process, though molten slag was produced. Applying intense heat meant that the iron ore could be bent, twisted and rolled. Heat was thus the agent of transformation.

*Iron and copper alloy ores as bodily substances*

The ores of hematite and copper alloys have long been considered to have had healing properties; today in Boots Pharmacy copper alloy bracelets are sold to sufferers of rheumatism and arthritis, while the use of hematite to cure problems associated with the womb in medieval and Roman medicine has been discussed in Chapter 5 (Section 5.4.2). According to Pliny in his 'Natural History' written in the late 1st century AD, copper alloy mixed with milk was used to heal ulcers and diseases of the eye, to help with hearing and to heal the palate. When mixed with honey and sulphur or salt and water, dried and then consumed it was used as a purgative (Plin.Nat. 34.23 and 34.27). The 'flowers' (the prills created during smelting), also described as like the 'husks of millet' (ibid.), of copper were used as a medicine (Plin.Nat. 34.24). Additionally, an unspecified yellow copper ore is noted by Pliny to be particularly useful for acting 'as a check upon menstruation' and healing diseases of the male generative organs (Plin.Nat. 34.31, 34.45 and 34.46).

In other preparations, ores were likely combined with bodily substances of blood, fat, milk or urine. For instance, many of the iron ores collected could also have been roasted and ground down for making pigments (the preparation and significance surrounding pigments are discussed in Chapter 5 (Sections 5.4.1 and 5.4.2)). Hematite is also the mineral used for modern day jewellers' rouges, which is wetted with a refined oil before being used to polish the metal. Similarly, in the Iron Age, nodules of hematite (for example those found at Traprain Law (Chapter 5, Section 5.4.1)) may have been used for fine metal or bone working combined with oil or other viscous liquid animal substances. When ground down and combined with a binder (which in the Iron Age probably included fat, milk, blood or other viscous liquids) hematite is similar in colour, texture and smell to human or animal blood.

Additionally, a well made carbon steel knife was found in Phase 2 at Broxmouth, and, in order to create this alloy composition, the iron after smelting may have been gently quenched (McDonnell and Blakelock in prep. 2013, Salter and Ehrenreich 1984: 156, Tylecote 1986: 144-145) in viscous milk, fats and urine which would have been better than water as they do not risk cooling the object too quickly causing it to fracture or break. Combining hematite and iron ores with bodily substances will have enforced its healing and life giving associations. Indeed, nodules of hematite were historically known as 'blood stones' (Williams 1810: 376).

*Colour*

Rubbing and polishing with fine-grained sandstone will have transformed the dull, dark surfaces of smelted iron and copper alloys into luminous reflective surfaces. This was perhaps regarded as analogous to pools of water (Giles 2008: 71), in which many metal objects were probably subsequently deposited (Bradley 2000), and thus absent from the south-east Scottish Iron Age archaeological record because of the excavation focus on settlement sites. The "warped" and "distorted" reflective luminosity of both polished copper alloy and iron mirrors from the Iron Age perhaps meant that they were experienced as portals into another world (Giles 2008: 71). It is possible that other burnished and polished copper alloy and iron objects (fittings and ornaments, pins, brooches, and other items of jewellery) embodied some of this supernatural power.

Different copper ores were recognised by their varying radiant colours, and their subsequent smelted alloys ranged in colour. High compositions of arsenic, tin and zinc are tinted silver, golden red-brown, and yellow respectively (Hosler 1994: 229, Hunter 2004: 43). The high tin-bronzes from Knowes, East Lothian, whilst making the wire stronger, may also represent a deliberate attempt to add a silvery tint. Furthermore, the introduction of brass in the Later Iron Age marks a colour change from golden to yellow-silvery metals. For example, a twisted hoop with terminal ends which had been silvered on its surface was found at Dryburn Bridge from a probable Late Iron Age context (Dunwell 2007: 51, Hunter 2007b: 78-79). White metals were used by the Romans for making decorative items (Dungworth 1997: 903) and deliberately whitening the surface of copper alloys was a common Roman practice (Hunter 2007: 78-79). The adoption of high zinc copper alloys by indigenous communities may thus be understood as a means of negotiating new hybrid Roman-native identities.

*Sound*

The properties of sound are highlighted here to distinguish metal from the other categories of worked stone, worked bone and antler, and pottery previously discussed. Hollow objects made of tin or zinc copper alloy sheet, or non-leaded cast copper alloys will have been the best transmitters of sound (Hosler 1994: 57). Wrought and smithed iron was unlikely valued for its sonorous qualities because of its porous and spongy structure which will have dampened sound. Nevertheless, the use of iron tools to rhythmically chip away at coarse-grained stone will have been a loud accompaniment to the manufacture of querns (Chapter 5, Section 5.3).

Various alloys of copper and zinc are used to make modern day brass instruments, while a range of tin bronzes are used to make cymbals. The Deskford carnyx, found in north-east Scotland and dated from AD 80 to c. AD 200-250, was an Iron Age musical instrument made of a range of sheet copper alloys. Energy-Dispersive-X-Ray-Fluorescence Scanning Electron Microscopy (EDXRF-SEM) analysis of this carnyx showed that a range of alloys were used concurrently to make the different constituent parts of the instrument; the main body and the snout and jaw were made of brasses, whereas the rest of the head and palate were made of bronzes (Hunter 2004: 38). Different alloys were used in this object as a decorative colour contrast (for example the snout and jaw glowed yellow in contrast to the darker red-browns of the head and body (ibid.)), and also perhaps to enhance the range of sonorous tones. Altering the pitch by employing different copper alloys, increasing the size and adapting the physical form of bells (especially wall thickness) has been argued as an important driving force in the development of metallurgy of ancient West Mexico (Hosler 1994). It may be that in Iron Age south-east Scotland copper alloys were also valued for their qualities of sound. The inclusion of tin or zinc in the composition will have enhanced different pitches of the alloy and may have been a consideration in the manufacture of hollow objects made of sheet copper alloy, including cauldrons (such as the one found in a hoard at Newmains, unpublished), tubes and fittings.

### 7.3.2 Pragmatic

The various alloys of iron and copper had different strength, tensile, hardness and other properties relating to their workability, and these were knowingly exploited. It is clear that working iron and copper alloy was well understood from the Early Iron Age in East Lothian. This will be discussed in more detail in the next section.

## 7.4 Exploited Affordances

Iron and copper alloys were used to create different types of objects in Iron Age East Lothian; iron was used for large and small tools (four tools for fine crafting were found at Broxmouth), fastenings and fittings, and copper alloys for smaller personal and ornamental objects which were sometimes decorated. Iron was perhaps more suitable for making everyday tools which will have required maintenance and repair since it can be smithed repeatedly, whereas copper alloys have to be totally re-smelted. At Fishers Road West an iron nail head with copper capping was found (Heald 2000: 39); in this case the structural properties of iron was valued, and the softer decorative sheen of copper. Yet, there are two possible fragments of iron pins from Broxmouth (FFH, Phase 6 and BLV, unstratified) (Hunter in prep. 2013) and an iron peg attached to a skeuomorphic black antler dome (DKX, Phase 6), which show that iron was also used for complex and decorative artefacts made using composite materials.

### 7.4.1 Manufacture and modification

*Iron*

Predominantly, iron was used to make blades and larger tools such as the ard found trampled into the surface of a midden store at Phantassie (SF494) (Lelong 2008: 187, 189, fig.7.39) and the balanced sickle found in a pit at Dryburn Bridge (DB658) (Dunwell 2007: 71). An elongated sub-triangular iron fragment (GDN) from Phase 2 at

Broxmouth was analysed using Scanning Electron Microscopy and was found to be a moderate carbon steel (McDonnell and Blakelock in prep. 2013, Figure 66). The steel used to make this knife made it harder, stronger, and will have helped maintain sharper edges for longer.


**Fig.66**: Carbon steel knife GDN from Broxmouth, found over cobbling in the Inner Ditch, Phase 2. (photograph: J McKenzie)

*Copper alloy*

The XRF analysis carried out on the copper alloys in the Broxmouth and Traprain Law assemblages demonstrated that they were typical Iron Age tin-bronzes with arsenic impurity (Dungworth 1996 , Kirk et al in prep. 2013). Dungworth (1996) analysed seven copper alloy objects from south-eastern Scotland using EDXRF: two from Broxmouth (a stud or nail (FWP) and a strip (DEG)) and five from Traprain Law (a pin, three pieces of sheet and a U-shaped binding, none of which were given catalogue numbers). Two of these, a stud or nail from Broxmouth and a U-shaped binding from Traprain Law, had a relatively high lead content (ibid.: 418). This will have made these fittings slightly harder but more brittle and therefore unsuitable for load-bearing structural purposes, but ideal as part of delicate composite artefacts partly made of organic materials.

Additionally, the inclusion of lead in copper alloys (which will have made the metal composition more fluid but brittle) was noted in Dungworth's analysis of copper alloy objects from northern Britain, perhaps to make it easier to cast in moulds (Dungworth

1996: 402, Dungworth 1997: 902). The addition of lead to bronze to aid casting was practiced at Fishers Road East (Lowther 2000a: 138) and Knowes (Hunter et al 2009: 139-140) in East Lothian. A piece of wire (SF193) from Knowes, possibly from a penannular brooch, was made from a 'tinned leaded brass' or a homogenous mix of two or more alloys (Hunter et al 2009: 139-140); the zinc was possibly from a Roman object, but could also have been a natural impurity. The addition of lead will have made the metal more malleable, whereas tin will have increased the strength and tensile properties for wire working. The same affordances of lead and tin were exploited in a small penannular loop or coil (SF193) made from a possibly tin leaded bronze from the same site. On the other hand, the sheet metal from Knowes was made from unleaded bronze (SF212 and SF202) with low levels of tin, similar in composition to the copper alloy sheet from Broxmouth (Kirk et al in prep. 2013) and to the alloys widely used in the Roman period for sheet and wire working (Dungworth 1997: 905). The six Iron Age copper alloy objects discovered at Dryburn Bridge were also analysed using XRF (Hunter 2007b: 78-79): as expected all the sheet fragments were unleaded bronze, whereas the cast objects were a leaded bronze.

The majority of copper alloy objects from Phase 6 at Broxmouth include zinc in their composition (Kirk et al in prep. 2013). The inclusion of zinc probably originated from the recycling of Roman copper alloys (Dungworth 1996: 408-410), discussed in Section 7.2. The presence of zinc increases the hardness while lowering the melting point of pure copper (Tylecote 1986: 38), and so may have made it easier to make a wider range of objects.

Interestingly, in contrast to Dungworth's (1996: 402) analysis which demonstrated that lower tin contents are found in wrought than in cast copper alloy objects from the northern British Iron Age, a relationship between cast objects and higher tin alloy composition is not demonstrated in the XRF analysis carried out on the Broxmouth assemblage (Kirk et al in prep. 2013). Indeed, in Dungworth's study (1996) the differences are sometimes negligible and it is questionable whether there were in fact noticeable changes in the workability of the metal.

*Skeuomorphs*

Iron and copper alloys were sometimes employed interchangeably to make certain types of objects. For example, an iron axe found in the lowest levels of Traprain Law resembles Late Bronze Age examples made of bronze which were also found at this site (Jobey 1976). Indeed, bronze forms of axes and hafts were continuing to be made across the British Iron Age after the introduction of iron forms and technology. Unusually there are three brooches made of iron (one of which does have a bronze pin) from Traprain, which may date to the 2nd century AD based on


**Fig.67:** Wrought iron antler from Traprain Law (Burley1955-56: 186 , Curle 1914-15: 196, fig. 44.1). There is no obvious iron manufacturing reason for creating wrought iron in this shape. The tines have been wrought and twisted into a point and then broken off. (photograph: M Maxwell).

copper alloy counterparts (Burley 1955-56: 162). Different ways of working and particular forms were not necessarily limited to the metal used.

Metal designs are also referenced in the spoon (EIX), ring-headed pin (FXB) and spiral ring (EXA) made of antler and bone from Broxmouth (Box 3, Chapter 3). From Traprain Law there is a particularly interesting skeuomorph of a deer antler made from iron (Burley 1955-56: 186, Curle 1915: 196, fig. 44.1) (Figure 67). As discussed in Chapter 3 (Section 4.4.2 and Section 7.3.2), this object may have embodied the signative powers of both antler and metal.

**7.5 Use-wear: fragmented**

The corrosion and disintegration of metal objects in the acidic soils of East Lothian has meant that very few whole metal objects, or parts of composite objects, have their original surfaces surviving. Copper alloy artefacts survive slightly better as whole pieces, whereas iron artefacts are highly fragmented; of the 26 iron objects recovered in Iron Age contexts at Broxmouth, only three were intact (Hunter in prep. 2013). The high proportion of fragmented iron objects is replicated in the assemblages recovered from across East Lothian, including Traprain Law (Hunter 2009, Table 15, Appendix 8), and probably reflects how iron was valued for its ability to be re-worked, only deposited after heavy use and breakage beyond repair. Nevertheless, most metal objects (rivets, nails, sheet, knives and even pins) were originally part of larger composite objects, probably with organic materials. For example, an iron pin from Broxmouth is still attached to an antler dome pin head (DKX). For these reasons it is difficult to determine the character of use-wear on the majority of metal objects.

Despite these issues of preservation, it is noticeable that the recovery of metal objects gradually and incrementally increases towards the Late Iron Age at Broxmouth, though this is still based on a small number of recovered objects (Table 16). Table 16 is not suggestive of a change in practice after Phase 4, but rather it is likely that maintaining objects in use and recycling continued to be practiced throughout Broxmouth's occupation, in tandem with the increasing availability of metal in the Later Iron Age. Unfortunately the dating of metal artefacts from other sites in East Lothian is not accurate enough to determine whether an increase in the number of metal objects occurs over time elsewhere. However, a deliberately cut iron staple (finds code CEJ) was found at Broxmouth (Hunter in prep. 2013), and of a total of nine iron objects recovered from stratified Iron Age contexts at Phantassie (Hunter 2008), five were broken. This is perhaps further evidence of the recycling of metal.

Use-wear does survive on a few iron and copper alloy objects, and is illustrative that these objects were well-used before their eventual deposition. At Traprain Law a single copper alloy cast ring-headed pin typical of the Early to Middle Iron Age was found in the topmost layer in which were also some Roman artefacts: it seems, therefore, that this object was kept as a heirloom (Jobey 1976: 195), although we must be cautious because of the notorious problems in unpicking the stratigraphy of Curle and Cree's excavations. The shaft of a moulded copper alloy ring headed pin from Rhodes Links (FC 236) was slightly damaged and pocked from exposure, probably from extensive wear built up during its use. The iron linch pin inlaid with lead and bronze (SF 588) found at Phantassie was broken at both ends before deposition (Hunter 2008). The *terminus post quem* for the deposition of this linch pin is 40 cal BC- cal AD 130, which is later than the normal date range for these objects (Lelong 2008: 170). These few examples were kept in circulation and had long biographies.

### 7.6 Deposition

From Broxmouth 51% of the copper alloy and iron objects were from unphased contexts; in topsoil or other insecure and unstratified deposits. Despite this, episodes of structured deposition do survive, especially in the area of House 6 at Broxmouth which accounts for just over 20% of the total copper alloy artefacts recovered from all stratified and phased contexts.

Towards the end of Phase 6, after the abandonment of House 6, a series of pits were infilled with layers of gravel and ash deposits which included a substantial assemblage of copper alloy artefacts and other objects (Figures 68, 69, 70, Appendix 9). These pits may mark the abandonment of this structure. A copper alloy needle, broken across its perforation and at its tip (EIU), was included in pit JCH which cut an earlier inner entrance posthole to House 6 (Figure 68). Three copper alloy artefacts including a broken horse harness fitting (CFS) (Figure 69) were found in pit JCW located outside House 6. In this pit was also a rotary quern fragment and two bone points. It is argued that these pits and their infilling were episodes in the structured decommissioning of House 6 (Büster et al in prep. 2013). Of the seven copper alloy and iron objects recovered from these pits five were broken, possibly deliberately bent and snapped (ERW, EIU, EZW, CFA and FFH).

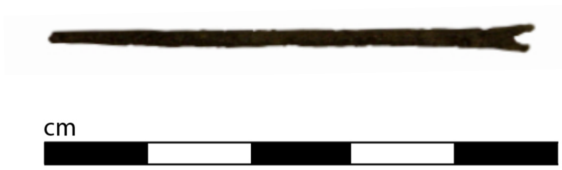



**Fig.68:** Copper alloy needle (EIU), broken across perforation and at tip found in pit JCW outside of House 6. (photograph: M Maxwell).


**Fig.69:** Horse harness fitting found in pit JCW outside of House 6.
(photograph: M Maxwell)

At Traprain Law three socketed bronze axes were associated with a cache of barley and a saddle quern in the lowest levels of the west terrace (Jobey 1976: 193, Cree and Curle 1922: 204). This may have been a deliberate assemblage deposited to reference the transformative power of copper alloy working embodied in the axes. This theme is referenced repeatedly in Iron Age East Lothian via acts of structured deposition. At Phantassie an iron ard was found 'trampled into the surface' of a midden store, dated to approximately the 2nd century AD (Lelong 2008: 187), perhaps making a deliberate link between the renewal properties of the midden and the agricultural cycle. Commonly, copper alloy and iron artefacts, and their associated working debris in the East Lothian Iron Age were found in secondary midden contexts, in pits, ditches and houses. For example, two smithing hearth or furnace bottoms (DQL and DPI) were deposited in midden in Phase 3 at Broxmouth. They may have been deliberately deposited in midden because of beliefs of transformation and fertility attached to such deposits. The iron ring from Dryburn Bridge (SF 160) was found in loam packing of the central posthole of a house along with a fragment of animal bone, an example of the re-use of midden in important construction episodes. Perhaps the deposition of an iron disc (BZI) and an iron strip, of which both ends are broken or snapped off (BZO), in two separate closely dated (cal AD 80- 330 (GU-22206 and GU-22207) and cal AD 80-240

(GU-22205)) terminal postholes in House 2 at Broxmouth was a deliberate act to mark and enact constructions of transformation, or moments of generational transition. At Phantassie, the iron draw bar (SF 543) had been deliberately pushed upright into midden over an abandoned structure, near to a penannular copper alloy brooch (SF 435). This suggests that the person who deposited the draw bar remembered the location of the brooch (or vice versa), or that this was a frequented and suitable location for depositing metal artefacts.

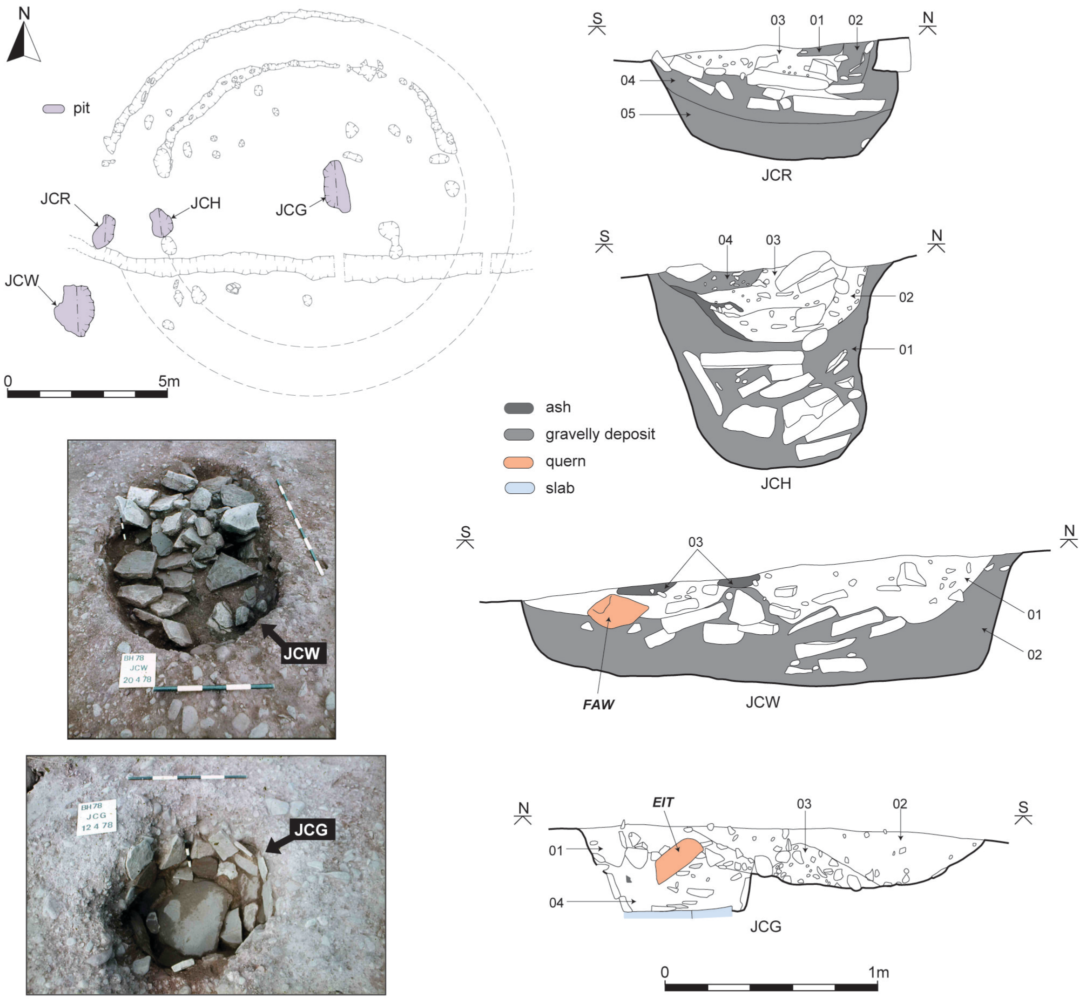



**Fig.70:** The later pit features in the area of House 6, towards the end of Phase 6. These pits include an impressive assemblage of copper alloy metalwork and other structured deposits, listed in Appendix 9. (Broxmouth Hillfort Project 2008-12)

There are also instances of the deliberate assembly of materials which embody transformative powers. At Dryburn Bridge an iron sickle (SF 658) was found in a elongated pit (a potential souterrain) along with a sherd of Roman glass, a shale bracelet fragment and chipped stone (Dunwell 2007: 71). These are all materials which can spark when rubbed or ground. A dog burial dated to cal AD 80-320 cut this feature, providing a *terminus ante quem*. It is suggested that the inclusion of a sickle in this potential souterrain is significant, as sickles are inherently linked to the agricultural cycle and ideas of fertility and productivity (Hingley 1997: 13-14). There are striking parallels with the hoard in House 1 at Broxmouth which included five glass bangles fragments (one of which has a ground facet), three refitting but abraded and chipped samian sherds and a roman bottle glass fragment (Figure 71). Again, these are all electrostatic materials which had been fragmented, chipped and ground. Perhaps the deposits of ash in the fills of the House 6 pits at Broxmouth in which a large proportion of the metalwork from Broxmouth were found, were also included to reference the transformative power of pyrotechnia (Figure 70).

The bringing together of the sickle (itself a creation of the colourful pyrotechnic technologies of smelting and smithing) with other objects which all have the ability to spark, in the infill of the potential souterrain at Dryburn Bridge was perhaps a deliberate act. There is more than one fill in this feature (Dunwell 2007: 69), suggesting they were deposited over time. Souterrains were probably used for storing crops and produce, and their abandonment, destruction and infilling with ashy deposits, have been argued to be deliberate performative episodes linked to beliefs and ideas concerning the production of agricultural surplus of fertility and prosperity (Armit 1999: 586).

Finally, at Broxmouth and Dryburn Bridge there is also evidence for the deliberate storage of metal artefacts which were perhaps placed in pits to be returned to, re-used and recycled. Three iron artefacts (fragments of a knife, ferrule and rod) and several pieces of copper alloy sheet and other fragments from Dryburn Bridge were found in the same pit lined with slabs. The excavators suggested that this was a possible working hollow (Dunwell 2007: 71) and it is thus possible that these objects were meaningfully deposited here or alternatively the pit was used to store metal for recycling. A copper alloy penannular brooch (FUA), apparently whole (the object was lost post excavation), was found in a clay lined pit (OAC) in House 1 at Broxmouth which also included a sheep bone point (GEX) and an almost complete rotary upper quern (FUB).

### 7.7 Conclusions

Until now, Traprain Law has been regarded as the central place in Late Iron Age political relationships, largely based on its access to a breadth of exotic and Roman origin artefacts made mostly of iron or copper alloy. However, this chapter has highlighted the distributed evidence of iron and copper alloy working technology across sites in East Lothian, and significantly the absence of evidence for iron smelting at Traprain Law. This means that the social relations in the south-east Scottish Iron Age have to be re-thought.

Iron smelting was practiced on nine Iron Age sites in East Lothian, whereas smithing was practiced more widely. Broxmouth has the earliest evidence for iron smelting and smithing taking place from 705-455 cal BC. Iron smelting was therefore a specialist technology to which only certain communities had access. Evidence for copper alloy working is not well preserved, but traces do survive from Broxmouth, Fishers Road East, Phantassie and Traprain Law.

Many of the materials, including clay, fuels and liquids required for iron and copper alloy working were available from agricultural activities and were also used in other crafts. The evidence suggests that local bog iron ores were used at Broxmouth, which may have been gathered or mined from the landscape. There is evidence to suggest that iron scrap or objects were also re-smelted. Copper alloy ores may have been locally mined or gathered in the local landscape of south-east Scotland, and lead could have been extracted from these ores. However, tin required for making bronzes was originally sourced from south-west England or the Continent, and was thus involved in extended, perhaps episodic, networks of appropriation. Copper mining evidence and the production of ingots for trade is limited to a few sites, suggesting the specialist and controlled access to copper ores. By the Late Iron Age, if not earlier, the main source was the recycling of copper alloy scrap or objects already in circulation and the smelting of Roman copper alloy objects.

It is argued that iron smelting was an inalienable performance because of the specialist equipment involved (including a furnace and tuyères) and its requirements for shelter. The resource and signative investments along with the intimacy and danger involved, also meant that iron smelting know-how was inalienable. Copper alloy smelting, on the other hand, is argued to have been an alienable technology because smelting does not require specialist super-structures (it could even have taken place on the domestic hearth), and involved many more stages and therefore probably individuals. However, exposure to the fireworks and inhaling the dangerous fumes from either copper alloy and iron smelting may have permanently affected the health of the individuals involved and marked them out as different. Additionally, both processes involve concepts of fertility, creativity/destruction, and productivity. Those involved likely took on a central role in creating and directing the future productivity of the community.

Therefore, iron and copper alloy were knowingly worked by communities in East Lothian and deliberate choices were made regarding the use of either metal and the alloy composition of objects. This was not only a pragmatic choice, but colour, sound and supernatural powers were also possible considerations.

There is an increasing popularity of silvery coloured copper alloys in the Late Iron Age from increasing contacts with Roman communities. The colour of metal may have played a role in the negotiation of native identities at this time. The adoption and indigenous re-working of silvery-white metals can be tentatively linked to the concurrent increasing visibility of decorative copper alloy artefacts in the archaeological record, but as has been discussed in this chapter with the clear evidence for recycling there are problems of envaluation; personal ornaments may have existed previously but were re-smelted.

Recovered metal objects are highly fragmented, in part due to preservation and taphonomy, but also there is substantial evidence that metal objects were recycled, and were cut and snapped for re-smelting. There are few examples of the deliberate curation of copper alloy and iron objects, but these objects do suggest that metal objects built up personalised biographies. Memories of previous human-material relationships may have played a role in the deposition of a draw bar and then a brooch on two separate occasions into the same midden over an abandoned structure at Phantassie.

Furthermore, there is evidence that copper alloy and iron objects were deliberately deposited in meaningful ways to enact their role in productivity and renewal/ transformation. For example, the copper alloy and iron objects deposited in the pits outside House 6 at Broxmouth are argued to be part of the decommissioning of this structure at the end of Phase 6.

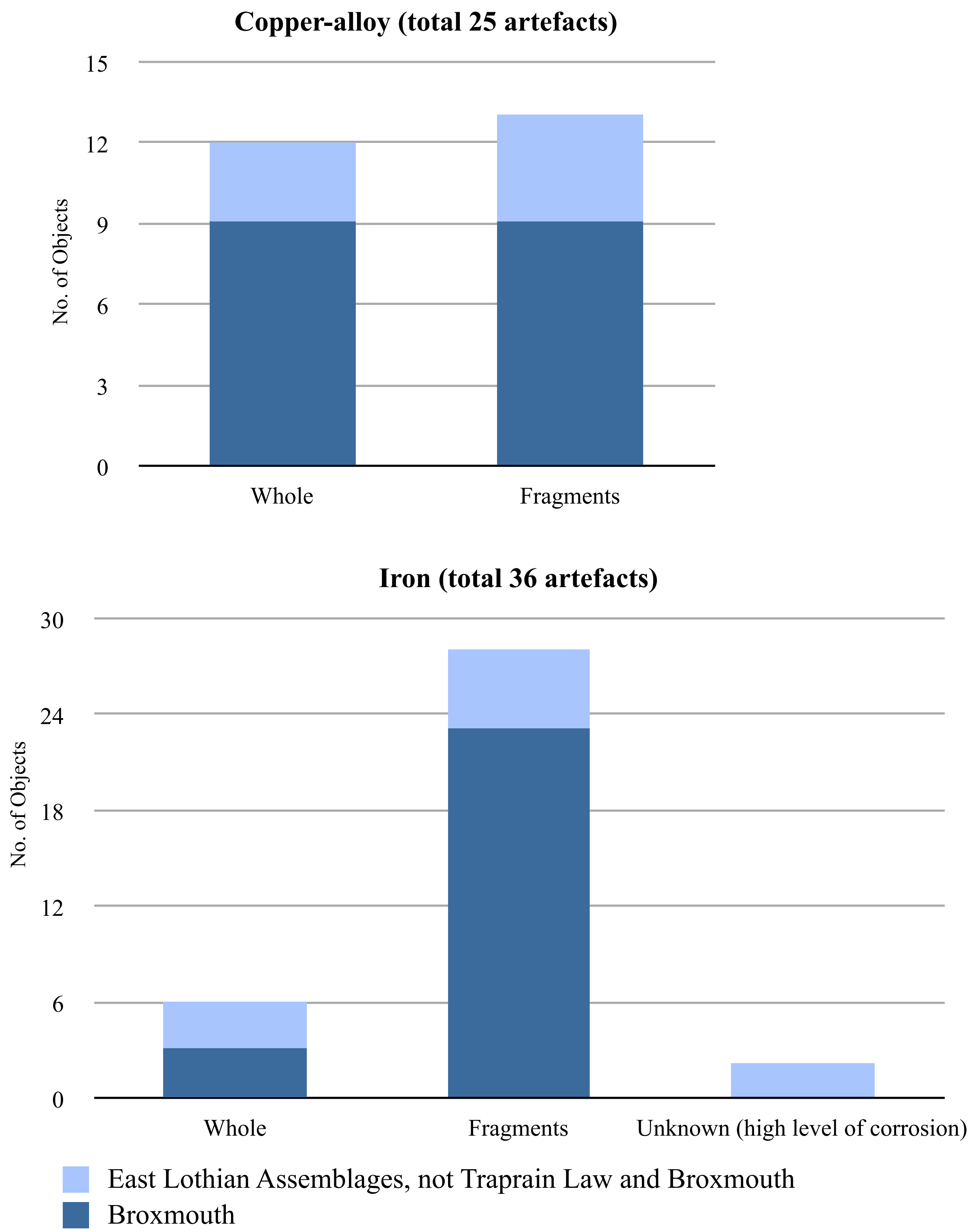



**Table 15:** Tables showing the numbers of whole and fragmented copper alloy and iron artefacts from all East Lothian stratified Iron Age assemblages, not including Traprain Law. 100% more copper-alloy artefacts survive as whole (12 as opposed to only 6 iron). There are substantially more fragments of iron. Iron was valued for its ability to be re-worked, and was only disposed of after heavy use and breakage.

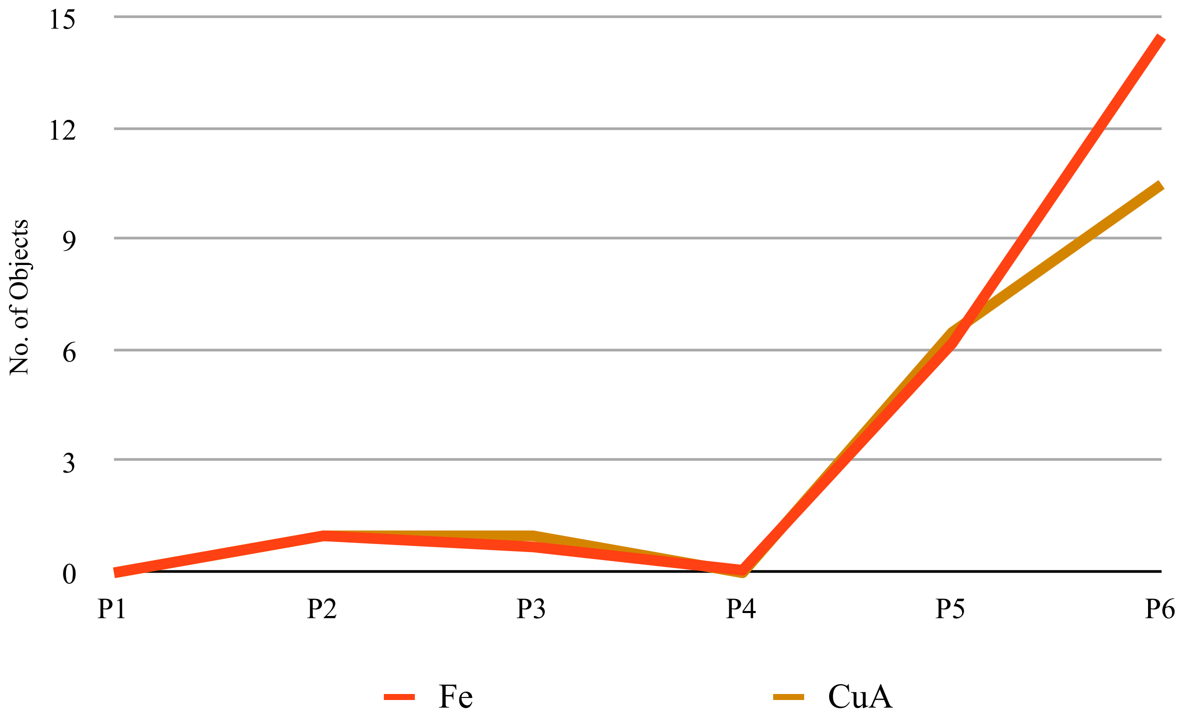



**Table 16**: This chart shows the gradual and occasional deposition of artefacts in the earlier phases to an increase of deposition of metalwork in the later phases at Broxmouth, although the numbers of artefacts recovered is small. Copper alloy and iron artefacts follow the same pattern almost exactly until diverging slightly in Phase 5, suggesting that both types of metal were appropriated and disposed of in similar ways through time. The increase in deposition in Phases 4/5/6 is incremental showing that more metal was available, but that objects were still being kept in everyday use and probably recycled before deposition.

# Chapter 8 Discussion

The accepted view of Iron Age society in northern Britain is of emerging hierarchies in the late Iron Age from a background of flat social organisations (e.g. Armit 1990a: 68-69, Hunter 2007:15, 2007a: 289, Sharples 2003) and the dominance of Traprain Law at this time in southern Scotland (Armit 1999, Hill 1987, Hunter 2009: 140-156, Jobey 1976). The materiality approach taken here has re-examined in detail East Lothian's Iron Age assemblages, supported by Broxmouth's phasing which has evidence for continuity in occupation and common trends in manufacture, use and deposition of a rich artefactual assemblage built up over 900 years. The results lead to a review of how we understand social relations in the Early and Middle Iron Age, and a nuanced re-orientation of Traprain Law's central position in the social system of the Late Iron Age, as will be discussed here.

Previous culture-historical approaches towards Iron Age Britain, which were based on typologies and which were focused on specific materials neglecting everyday material culture, separated and fragmented society (Chapter 2). On the other hand, a materiality approach instead recognises the complex networks of interaction between people and materials, and urges a review of how we envision Iron Age social relations. A materiality approach examining the biographies of the four categories of worked bone and antler, worked stone, pottery and metal from the East Lothian Iron Age has established cross-material connections. These connections, or 'flows of materials' (Ingold 2007, 2011), created and maintained cosmologies, identities and social relationships. This will now be discussed under four headings; appropriation and curation, renewal and creativity, skeuomorphism and identity, and soft and sustainable society.

### 8.1 Appropriation and curation

The majority of appropriated materials were available locally to the people of East Lothian. Local availability is defined as situated within the main study area of East Lothian. Antler was seasonally harvested, whereas all the species of animal bone used to make artefacts were available from butchered domesticate animal carcasses present in the site faunal assemblages. For instance, a perforated cattle tibia point (FZN) shows evidence of prior butchery at its epiphiseal end. The animal bone artefacts from Iron Age East Lothian are in general highly worked, masking indicators of earlier weathering and gnawing, and so it is unknown whether bones were appropriated fresh from the carcass which would suggest a seasonal appropriation linked to patterns of slaughter. However, there is evidence of the storage and curation of animal bone at Dryburn Bridge and widespread use of middens, which include animal bone, as resources for manure and materials which would have been available throughout the agricultural cycle (Chapter 4). Sourcing animal bones from middens would have embodied ideas of regeneration since middens, which were probably used as fertilisers on the fields, were intimately linked to the agricultural cycle. Therefore, animal bone which was not necessarily appropriated seasonally, was unlike the seasonal harvesting of cast antler. This, perhaps, was a reason for why skeletal deer bones (not antler) were avoided for working. Antler's link with the seasonal cycle, whilst embodying ideas of sexuality, fertility and masculinity, made it particularly suitable of making artefacts (Chapter 4). In addition, the small quantity of objects made of deer, horse and pig bones in Iron Age

East Lothian are also noted, and this is also reflected in the small quantity of these species found in the faunal assemblages. Only four points and a bead were made from pig bone (all of which are from Phases 3 and 5/6), and three points (CBC and DQG) and a handle (DVX) were made from horse/deer bones, all of which are from Broxmouth's remarkably well preserved assemblage. Additionally, pigs and horses were likely traded into Broxmouth (Cussans in prep. 2013), and it seems, therefore, that locally reared species were preferentially selected to make artefacts on site.

The types of stone used for craft and everyday activities were all readily available in the landscape of East Lothian and south-east Scotland in the Iron Age, except for two saddle quern fragments (EKC and FVB) from Broxmouth which were made of markle type basalt originating from south-west Scotland. Stones were selected from the landscape for their textures, for example only medium to fine-grained sandstones or basalts were used to make saddle and rotary querns, cupped mortars and blocks for grinding. Locality was often embodied in the objects themselves. For example, rotary quern fragment EIT (Phase 6) and saddle quern fragment FWY (unstratified), and the worked slab placed over grave J in the Cemetery (radiocarbon dated to 380-200 cal BC SUERC-24256) all have their limpet scars enhanced by pecking, expressing their appropriation from the coast or river scape. Pecking the old red sandstone will have created sandy dust, shrouding the craftsperson in a haar like cloud, referencing the drama of coast-scapes (Chapter 5, Section 5.3).

All the resources required for making pottery (clay, volcanic and igneous rock temper and water) were available locally. However, there are subtle variations in the fabric and forms of late prehistoric pottery between sites and within site assemblages, which may suggest that different sources were being appropriated by individuals, households and communities at different times. There is a shift in the dominance of Type 1 to Type 2 in Phases 5 and 6 at Broxmouth, and this more likely represents a change in the networks of engagement for accessing resources rather than for a functional reason because of the results of residue analysis, as argued in Chapter 6.

Analysis of iron slag and iron objects from Broxmouth suggests that local bog ores were used, while hematite (an iron ore) forms in these volcanic geological landscapes. In the 19th century it was quarried from Skid Hill Quarry in the nearby Garleton Hills (Canmore site number NT57NW9, Groome 1882: 237), and can be found today on the coast of White Sands (Figure 37). Recycling of Roman objects is also documented as a source on sites from Iron Age East Lothian for iron smelting. Other materials required for metalworking, including clay, fuels and liquids were available from agricultural activities and were also used in other crafts (pottery, hide working and antler working). Whereas resources for iron working were all local, specific tin sources for copper-alloy working are not known locally and may have been acquired through extended networks originating in south-west England (Dungworth 1997, Northover 1984). XRF analysis by Dungworth of objects from the northern British Iron Age shows that the tin component for copper-alloys was controlled, indicating that recipes were being followed by Iron Age smiths. For example, tin was found in higher quantities in cast than in wrought copper-alloy objects (Dungworth 1996: 401-402). The deliberate addition of tin to copper-alloy objects dated to the late Iron Age is documented at Broxmouth and at Knowes, both in East Lothian (Chapter 7). It is possible that the appropriation of tin through these networks may have been episodic, since another main source was probably the recycling of copper-alloy objects already in circulation. Certainly by the

Late Iron Age, the smelting down of Roman copper-alloy objects with a high zinc component is documented (Dungworth 1996: 408-410, Kirk et al in prep. 2013). Copper ores were available from south-east, southern and central Scotland, and a primary smelted ingot with no added alloying components was found at Edin's Hall, Roxburghshire, indicating the trade of copper-alloys extracted from nearby sources (Hunter 1999: 339).

Overall, materials taken from the local landscape and networks of engagement were selected and valued. This is seen in the choice of animal bone for working (and the avoidance of imported pig bones) and the enhancement of the limpet scarring on saddle and rotary querns from East Lothian Iron Age assemblages and the grave slab from Broxmouth. Furthermore, the variation between the resources appropriated for making pottery (Chapter 7) may even suggest that resources were not freely accessible and that different geological resources were genealogically, ancestrally or territorially controlled.

Despite the local availability of materials, objects evidently were well used and deliberately kept in everyday use. Artefacts of bone and antler were valued for their flexibility, durability and adaptability and have layered episodes of use-wear etched onto their surfaces. Despite limited modification in most cases, artefacts in the worked stone assemblage also had long biographies; many show layered and different types of use wear and the majority were found in contexts of re-use in construction. This may be seen in most cases as efficient re-use, although there is striking evidence for some querns having been repaired and re-dressed, and some being deliberately fragmented before inclusion in pits, postholes, walls or other building features (BZQ and FBI from Broxmouth are particularly interesting examples, Chapter 5). Over one quarter of the worked stone and over one third of the worked bone and antler from East Lothian Iron Age assemblages are broken or fragmented, and it is argued that the majority were broken in antiquity before ending up in the ground. Ancient breakage is also argued for examples of iron and copper-alloy Iron Age objects from East Lothian. It may even be that local material resources were seen as expendable, and not as a long lasting ubiquitous resource, encouraging practices of recycling and long-term use until breakage.

Only the tin required for copper-alloys was originally acquired through long-distance networks of appropriation, most likely from the Cornwall area in south-west England. There are few other materials indicative of contacts further afield, the markle type basalt from south-west Scotland used to make two saddle quern fragments found at Broxmouth (EKC and FVB) have already been mentioned. Additionally, the brasses used in copper-alloy working, occasional items of Celtic Art (including the copper-alloy horse-harness from Broxmouth), Romano-British brooches and bracelets, the samian and Roman coarseware, the Romano-British glass bangles, are indicative of contacts with Roman communities. Broxmouth's early contacts with the Mediterranean are attested by the coral bead (GOH) from Phase 4, perhaps indicating that extended networks of engagement may have existed before the Late Iron Age. Despite the extended relationships embodied in these materials, many show similar patterns of ancient breakage and re-use to those seen in local materials. The perceived affordances of these materials were suited to native materialities and were not 'other' or 'Roman' *per se*. Similarly to native materials, before deposition they underwent long biographies: most of the samian sherds examined were well abraded and worn, the horse harness from Broxmouth was broken, and the glass bangles from Broxmouth fragmented, of which one was ground down and smoothed at one end after breakage. Their deposition alongside native materials in the hoard in House 1, in Phase 5/6 midden deposits in the South West Entrance and Inner Ditch, in the terminal infill of House 7, Phase 6 at Broxmouth and the flagon as part of a feasting deposit in a late structure at Phantassie, were perhaps involved in the negotiation of local and non-local materialities and identities. The appropriation of materials through long-distance trade was not seemingly important, and did not imbue individuals with particular status or power (*contra* Helms 1993), but rather these materials were involved in local practices of maintaining and creating social relationships.

In particular, the deposition of materials with electrostatic properties and Roman pottery was arguably part of meaningful performances marking moments of transition and fertility. The deposition of Roman ceramics occurs at Broxmouth in the late 1st century BC and into the 1st century AD. This period is also when we see the throwing in of late prehistoric pottery vessels in foundation/abandonment deposits in House 2, House 4, House 5 and House 6, and the deposition of the hoard in House 1 (Figure 71), suggesting this was when social relationships were especially fluid.

The hoard in House 1, Phase 6, included three samian sherds from the same bowl (but which do not refit because they had undergone different biographies), along with fragments from five different Romano-British glass bangles and a fragment of Roman bottle glass (Figure 71). These objects were all broken, ground or chipped. Furthermore, the samian fragments had likely been curated for at least a generation before their inclusion in the hoard. The samian fragment found in the Phase 5/6 Inner Ditch was probably from the same vessel as those found in the hoard. The other samian fragments from Broxmouth are in late Phase 5/6 midden deposits in the South West Entrance, and in the terminal infill of House 7, Phase 6 in which was also found a disarticulated human bone fragment, indigenous objects of shale and bone and refitting late prehistoric pottery fragments. The dating range obtained for this structure's terminal infill, obtained from the human radius shaft, 40 cal BC to cal AD 130 (GU-18739) is earlier than the sherd of samian which is dated to the early Antonine period (c.138 AD), illustrating that deposition continued after the main episode of midden infilling or that the human bone

**Fig.71**: The House 1, Phase 6, hoard from Broxmouth. Five broken fragments of Romano-British glass bangles (one with worn facet) (FJR, FJSx2, FXNx2), one broken fragment of Roman bottle glass (FJS) and three almost re-fitting fragments (FJSx3) with differential wear from a samian bowl. (photograph: M Maxwell)

fragment may have been curated. It has been argued that the deposition of the samian fragment may have re-enacted the memory of the disarticulated human remains deposited here and to mark transition into the next stage of occupation, like the disarticulated human bone fragment from an intermediate midden infilling episode between stages of occupation in House 4 (Chapter 6, Section 6.5). Similarly, the Romano-British glass bangle fragments in the House 1 hoard are argued to be personal objects belonging to five different women (Bruhn in prep. 2013); their deposition perhaps part of a social re-structuring event, such as the rejection of an aspect of identity (status, coming of age, gender) or the death of these individuals. Perhaps the substances of people and things were believed to be of the same materials, as the curation of disarticulated human remains and samian at Broxmouth suggests (Chapter 4, discussed further below), and as the beheading of the flagon at Knowes and the amphora at Archerfield (as discussed in Chapter 6, Section 6.4.2). The occasional acts of hoarding and human burial were considered to have the same power during crucial times for the community. Females in particular have a presence in the interior at Iron Age Broxmouth; three women were buried in different areas (the paved area in the centre of the settlement, one outside of House 3 and the other individual at the south-west Entrance), two died 750 - 400 cal BC and the third some time between 370 - 110 cal BC. Their internment may relate to Iron Age beliefs linked to female fertility in life and death, as argued below.

## 8.2 Renewal and creativity

Materials appropriated from the local landscape accrued biographies through the network of their human and contextual relationships. As materials came to embody these relationships they acted as a tie between individuals, and thus it perhaps became increasingly risky to take them out of everyday circulation. This is exemplified in the complex biography of the antler bead re-made from another object, probably a handle, decorated with eight ring and dot motifs (GDC). Analysis using Laser Scanning Confocal Microscopy (LSCM) showed that more than one compass point had been used to incise these motifs, showing at least three stages in incising these motifs and therefore potentially more than one individual was involved in its decoration (Maxwell et al 2012, included in Appendix 10). Additionally, layered episodes of use-wear are evident on the worked bone and antler from Broxmouth and the worked stone examined from all sites in East Lothian Iron Age; cast antler beams were used as smoothers, pounders, picks and as a resource for making other objects; the same cobble tools were frequently used as grinders, whetstones and pounders; and saddle and rotary querns were repaired, re-dressed and re-used in construction. The re-use of large worked stone, saddle and rotary querns in stone built construction in the Phase 6 Interior at Broxmouth was resourceful. However, the finding that 70% of the querns included in paving recorded *in situ* were deposited with their grinding face downwards shows a common pattern of structured deposition (Chapter 5). Additionally, the re-uniting of refitting rotary quern fragments in deposition, after fragments had been put to different uses, shows that previous use-lives were remembered; for example the grinding face of FBI has longitudinal grooves from re-use as a sharpener on its grinding face, not present on its refitting partner DVR. At the same time, the partition of pairs of upper and lower rotary quernstones in deposition may be another social restructuring act linked to ideas of gender and fertility; by dividing male and female counterparts querns' role in everyday agricultural productivity ceased. Therefore the structural re-use of querns was both pragmatic and signative. It was perhaps dangerous to take querns, which were used to grind the everyday staple of grain and perhaps even grits for pottery temper or ore for iron working, out of everyday use. However, their inclusion in the construction and refurbishment of houses ensured the continuity and productivity for future generations of the household. Furthermore, their inclusion in rubble infill and midden deposits after the abandonment of houses perhaps enabled transformation into a new stage.

The fragmentary nature of the metal assemblages from the East Lothian Iron Age and the deliberately cut iron staple (CEJ) from Broxmouth are indicative of recycling. Despite issues of preservation (evidence for iron working is found on only nine sites in the region and evidence for copper-alloy working is not well preserved in the Iron Age record of East Lothian), it is noticeable that the number of metal objects recovered is small but nevertheless increasing towards the later Iron Age at Broxmouth (Table 16). This increased deposition of metal artefacts is not suggestive of a change in practice after Phase 4, but is gradual and incremental. It is likely that practices of maintaining objects in use by recycling continued throughout Broxmouth's occupation even when metal was becoming more frequently available. Unfortunately the dating of metal artefacts from the other Iron Age dated sites in East Lothian is not accurate enough to determine whether an increase in number of metal objects recovered over time is the case elsewhere. Other clear examples of recycling include the yoke-shafted pin from Phase 5 which was re-made from a bone point (ENO), the repair of the stem-like tail of an antler comb and the use of one of its teeth for possible bead manufacture (DCB), the replacement of a longitudinal perforation with a transverse perforation on an antler socketed handle (EIY) and the re-use of upper rotary quern stones DPK and FNC from Broxmouth as lower stones.

Overall, it has become clear that taking things out of everyday use was rare across the whole Iron Age period in East Lothian. The practice of maintaining things in use and recycling encompasses all material categories. In general the biographies of these materials have no formal ends as such, not even in their structured deposition. This is indexical to the agricultural cycle which embodied transformation, renewal and fertility. The significance of the agricultural cycle for structuring Iron Age cosmologies has been noted before in the Atlantic and northern British Iron Age in the structured deposition of ard and plough-shares since the late Bronze Age in kerb cairns, house walls, pits, in wet contexts (Hingley 1992: 23) and in souterrains used to store agricultural produce (Armit 1999a: 583-586). At Traprain Law three socketed bronze axes were found associated with a cache of barley and a saddle quern in the lowest levels from the Late Bronze Age (Jobey 1976: 193, Cree and Curle 1922: 204). The deposition of blacksmith tools packed in straw or grass in the base of a grain pit with 630g of processed barley placed on top dating to the middle to late Iron Age at Garton Slack, East Yorkshire, is interpreted as a performance of the relationships between agricultural growing, harvesting and processing and iron metallurgy (Giles 2007: 396). In Iron Age East Lothian the deposition of materials in middens may have performed beliefs linked to the agricultural cycle. Middens were used to infill houses prior to their refurbishment or abandonment at Broxmouth, while many of the saddle and rotary querns used to grind the staple grain were found in these deposits or re-used in the structural fabric of buildings, for pragmatic and symbolic reasons to ensure the productivity of the household. The sharpening grooves from agricultural tools on some of the rotary quern fragments can also be understood in this way, while the deposition of midden which included materials (pottery, querns and bone artefacts made from butchered cattle and sheep/goat) inherently linked to the produce of the agricultural cycle, marked transitional stages in the biography of a household. Seed impressions found on some late prehistoric sherds from Broxmouth may also express a link between pottery and the agricultural cycle.

It has also become evident that material categories were interchangeable and adaptable. Both antler pedicles and cobble tools were used as smoothers potentially in hide working and as pounders perhaps in the hulling of seeds, the preparation of temper or ores; at Traprain Law whorls were re-used as grinders; at Broxmouth and Traprain Law a few rotary querns were also used to sharpen blades or bone points; and in the Late Iron Age both hematite and samian could have been used to make pigments. Pottery manufacture and iron working share gestures and forming techniques (of bending, pounding and twisting) and resources (for example dung as temper and fuel, and clay for making the bloomery furnace and tuyères). This may be why numerous copper-alloy artefacts were placed along with pottery in pits outside House 6 in Phase 6 at Broxmouth (Chapter 7). Utilised antler beams were associated with metal-working (ferrous staining is present on many of the utilised antler beams at Broxmouth), and metal blades were also used to manufacture antler and shale objects (Figure 45). These three materials (metal, shale and antler) were intwined together from their conception. Experiencing and assembling materials in this way explains the phenomenon of skeuomorphism, defined as objects which reference a form more commonly found in another material. This will now be discussed in the following section.

## 8.3 Skeuomorphism and identity

Skeuomorphism is most effectively expressed in the iron antler from Traprain Law (Figure 67, Chapter 7). Skeuomorphs are also present in the antler and bone assemblage from Broxmouth, including the blackened pedicle domes of antler, the ring-headed pin made of antler which parallels known metal versions, and the antler spoon with chevron incision imitating a join and therefore a composite object made of other materials (Chapter 4). In the East Lothian Iron Age the process of skeuomorphism occurs over time as a result of the long biographies of objects which were being maintained in circulation and recycled. These skeuomorphs are therefore not fakes or a symbolic mimic of another prototype (Taussig 1993), or as political objects of hierarchical power (Knappett 2002), but are expressions of 'emergent properties' (Norman 1988). Skeuomorphs allow previously unrecognised properties to be thinkable and enable new qualities of materials to be recognised through their multiple human engagements and connections with other materials. The skeuomorph from Traprain is authentically antler beam and wrought iron at the same time. This object embodies the perceived affordances of both materials experienced through making; similar techniques and tools were used in antler and metal working (as exemplified in the compass tool normally associated with metal-working used to decorated the antler drum GDC) perhaps indicating that these activities took place in a shared space, and both processes embody ideas of fertility and sexuality (Chapter 4 and 7). Furthermore, important colour changes are shared; soaking antler to make it soft for working excretes a red substance, and iron is heated to be red-hot before hammering, bending and twisting. The affordances of materials were continually being experimented with; intuitively and creatively through known experience, networks of engagements and the spatial assemblies of materials. Furthermore, we can consider the use of various materials for the same crafts and re-use of objects in different crafts, as skeuomorphic practice: as an exploration of emergent material properties. Skeuomorphs call to attention the adaptability and connections between the biographies of mutable materials.

The recognition of the 'multidirectional transfer of information between and among materials' over space and time for understanding skeuomorphism has been called for by Frieman (2010: 37) in the context of stone tool technology in the European Bronze and Iron Ages. He argues that the knapping of a bronze arrowhead from Rethen, France, is an attempt at making sense of the new technology of metalworking, using well known stone-working techniques on an unfamiliar material (ibid.: 38-39). Metal was perhaps perceived as some sort of lithic. In Iron Age East Lothian it may be that Roman materials were legitimised or 'traditionalised' (ibid.: 42) by the native communities who interacted with these new materials in ways familiar to themselves (samian was not perceived as pottery but perhaps as hematite). Yet, in Iron Age East Lothian it is clear that metalworking and antler and bone working were well understood from the early Iron Age, and therefore we cannot interpret practices of skeuomorphism in these materials as an attempt to legitimise the arrival of new technologies. Rather, as highlighted in the paragraph above, it is the shared and emergent properties of materials enacted through networks of engagement that are important.

Identities, it is therefore argued, were manifested through making, using and depositing materials. The skills and know-how required for these crafts were in general interchangeable. For example, analysis has shown that a compass tool normally associated with metal-working was used to decorate the antler drum GDC and the vegetal charcoal pigment found in these motifs detected by Raman analysis perhaps further enforces this link as charcoal was a specially produced fuel used in the bloomery process (Chapter 4 and Maxwell et al 2012, included in Appendix 10). Metal picks, chisels and blades were used in antler working and stone working (Chapter 4 and 5). The gestures of pounding and grinding of temper for pottery, were similar to the preparation of iron ore or grain. The beating and pounding of clay were similar to gestures used in the smithing of iron.

The skills and know-how required for these crafts were also in general alienable. The manufacture of late prehistoric pottery and worked stone could take place throughout the agricultural cycle and required no specialist equipment or super-structures. The link between bone working and metal working has been made already, and indeed both perhaps used the same files, grinders and polishers in the final stages of manufacture. Therefore, these were crafts that could be practiced in shared spaces, not dictated by social or environmental restrictions. It is argued that the variations in body and rim forms of late prehistoric pottery were a result of individual or group preference and technique, and that different fabrics were linked to resource availability perhaps controlled by generational ties or territorial rights. This conclusion was reached after residue analysis of encrustation showed that there is no proven link between preserved lipids and the function and design of late prehistoric pottery, since there was no significant patterning between types of residues absorbed and different design factors of fabric, rim and vessel shape (Chapter 6, Section 6.4.1).

Taylor has argued that skeuomorphism is a conscious practice to emulate materials of higher value, which were perhaps inaccessible to certain communities (Taylor 2007, 2012). There is an increasing popularity of silvery coloured copper-alloys in the south-east Scottish Late Iron Age, resulting from the recycling and smelting down of Roman alloys which were high in zinc (Chapter 7). The colour of metal may have played a role in the negotiation of native identities in the Scottish late Iron Age. Indeed, the iron bloomery and copper smelting process are argued to be the only specialist crafts, perhaps occurring at certain sites or episodically. Evidence for copper alloy mining and the production of ingots for trade is limited to a very few sites, while there is only evidence for iron bloomery smelting at nine sites in Iron Age East Lothian and copper alloy smelting at three (Chapter 7). In contrast, iron smithing was practiced more widely. Iron and copper-alloy were worked with skill by these communities in East Lothian, as it is clear that deliberate choices were made regarding the alloy composition affecting the tensile properties, hardness, strength, and colour of objects, while copper alloy and iron metals could be used interchangeably for the same designs showing a high level of skill. Know-how of the metal working process was inalienable, due to the resource and signative investments involved, its intimacy and danger. The metal working process embodies concepts of fertility, danger/violence, creativity/destruction, and productivity. For these reasons, explored in Chapter 7 and discussed further below, it is argued that metallurgists likely took on a central role in 'forging' identities and social relationships (Giles 2007), creating and directing the future productivity of the community. The iron antler from Traprain Law embodies the familiar creative power of antler in the inaccessible technology of metal.

Skeuomorphism, or in other words the interconnected cosmologies, toolkits and skills involved in working materials, have important implications for understanding how society worked. It will now be argued that the materiality of the East Lothian Iron Age represents heterarchical social relations.

**8.4 Soft and sustainable society**

In the Iron Age of the Western Netherlands, opposing soft and hard qualities of materials were performed in acts of deposition (Kok 2011). Soft and impermanent materials including artefacts made of bone from fleshy bodies were deposited in wetlands, whereas imported ceramics were deposited in transitional areas which could be both dry and wet, depending on the season. The deposition of hard materials in this way was perhaps an attempt to enact their transformation and acceptance into the soft materialities, wet and shifting landscapes of the region (ibid.). The materiality of the East Lothian Iron Age was soft: it could be moulded and easily manipulated for use and re-use. Thus materials were not solid but were essentially formless, adaptable and impermanent. Stone, bone, antler, metals and materials for making pottery were all experienced in this way. Stones were valued for their textures which were then ground down to make stone balls, or in their use as querns, sharpeners, grinders or smoothers. The deliberate fragmentation of querns by breakage, smashing and burning perhaps references impermanence and stone's ability to turn to dust; for example, one half of rotary quern upper BZQ at Broxmouth was burnt and lower rotary quern SF 65 was found in a hearth associated with feasting debris at Knowes, East Lothian (Haselgrove et al 2009: 89-90). It is also interesting that out of the stone only those which were coarse-grained were decorated and possibly deliberately fragmented; the effort was therefore greater than would be required for finer grained stones adding to the performance, involving large swinging gestures, creating large quantities of sweat and sand. Stone grits and dust became part of the pliable clay in pottery manufacture. An abraded sherd and stone ball were both found in a posthole in House 4 at Broxmouth, perhaps a deliberate reference to their softness. Late Prehistoric pottery was not fired at a high enough temperature to prevent decay once deposited in midden. This impermanence may have been deliberate, since the technology to prevent this was well understood through metal-working technologies requiring high temperatures, and the production of artefactual ceramics, occurring at Broxmouth from as early as Phase 1. Similarly, the smashing of Roman coarse-ware and grinding down of samian fragments can be understood as enacting the breaking-down of the substances of ceramics. Hence, the deposition of materials into the spongy soil of rapidly decaying midden was particularly appropriate.

In addition, late prehistoric pottery, samian, and hematite may have been perceived as bodily substances. Samian and hematite were ground down and possibly used to create pigments (Chapters 5 and 6). The association of a chipped samian fragment with a disarticulated human radius fragment with peri-mortem trauma in the terminal infill of House 7 may be significant. The iron content in samian and hematite will have meant that when ground down it would have smelt similar to blood. Antler too, when soaked for working, bleeds a red substance (Chapter 4, Box 2). Stones were perhaps perceived as flesh (Chapter 5), and the bones used for working originated from soft fleshy bodies (Chapter 4). Iron-working (Chapter 7), pigment preparation (Chapter 5, Section 5.4.1) and antler working (Chapter 4 Box 2) may have involved bodily substances of fats (oils), milk and urine. The smelting furnace secretes a fluid discharge. Both metals and pottery were cooked (the latter perhaps even on the domestic fire) and this is indexical to sexual intercourse or giving birth as discussed in Herbert (1993), see below, and Chapter 6; the Matakam blacksmith calls forging ‘iron cooking’ (Richards 1981: 229).

Unlike modern Western culture which views formless substances, in particular those from the body, as negative and even repulsive (Kristeva 1982), these substances may have had positive connotations in the Iron Age. The softness of form was life giving. Recognising the decay, transformation and emergence of substances for understanding archaeological materialities has been called for by Pollard (2004: 47-62) who recognises that processes of decay and attrition even “have the potential to create entirely new kinds of substance”, whilst it “gives a heightened awareness of the qualities of material" (Pollard 2004: 55-56). The transformative qualities of materials were perhaps deliberately referenced in the deposition of an iron sickle (SF658) with a sherd of Roman glass, a shale bracelet fragment and chipped stone in a pit at Dryburn Bridge (Dunwell 2007: 71), which brought together a group of materials which all have the ability to spark when rubbed. Metal tools were also used to manufacture shale objects (Figure 45), and so both materials were associated with each other from their conception. Similarly, quartz may have been linked to activities involving heat or other materials with electro-static properties; a circumferential quartz grinder was found in the hearth of House 1, Phase 6 and a quartzitic sandstone fragment from a rotary quern was found alongside a group of metal artefacts in a pit near House 6, at the end of Phase 6 at Broxmouth. The deposition of plough-shares and ards, and agricultural produce (grain, bog-butter, butchered animal remains) in fluid wetland contexts, in ditches or pits dug out of the soft ground in the British Iron Age may be understood in this way (Armit 1999a: 583-586, Giles 2007: 396, Hill 1995, Hingley 1992: 23), ensuring the non-opposed processes of decay and renewal, making and unmaking things. At Traprain Law three socketed bronze axes were found associated with a cache of barley and a saddle quern in the lowest levels (Cree and Curle 1922: 204, Jobey 1976: 193). Also, perhaps for similar reasons, the iron draw bar from Phantassie (SF 543) had been deliberately pushed upright into midden over an abandoned structure, near to the penannular copper-alloy brooch (SF 435). The deposition of things, particularly those with electrostatic properties, into soft and spongy middens in the East Lothian Iron Age along with ash, faunal bone and dung enacted decay and transformation, their messy conglomeration giving the potential to think of new connections, new hybrid forms and even new uses (Pollard 2004: 59). Perhaps this was how the connections between antler and metal were discovered leading to the link between antler working and metalworking, and also explains the occurrence of skeuomorphs found at Broxmouth and at Traprain Law. Pollard has argued that midden deposition in the European Neolithic was the motivation behind the creation of figurines which combine human, animal and object forms (ibid.: 57-59). The circumstances of structured deposition discussed in the previous chapters enacted the complex interplay of materials, their emergent properties and decay. This concept of transformation embedded in the materiality of the East Lothian Iron Age meant that society was sustainable in the long term.

The force of transformation was the motivation for Iron Age materialities; it has become clear that the 'flows of materials' (Ingold 2011: 51-62) were intimately understood and exploited by communities. A concept based on flows of materials includes the whole environment, the creators and the users. This is exactly what the designers Lukić and Kātz strive for in their concept of 'nonobject' which "starts not with the user or the object but with the space between" (Lukić and Kātz 2011: 2) to create familiar yet unpredictable objects in a deliberately unfinished state to "play with the real world of being and becoming" (ibid.: 50). A co-operative approach recognising 'emergent properties' through use is also central to the theory of modern participatory design theory (Barab et al 2004, Norman 1988, Schuler and Namioka 2002, Wakkary and Maestri 2007). These designers reflect on how changes and re-orientations occur along the process as a result of involving the users and getting to know the environment they are designing for. Additionally, participation of various stakeholders fuels designs into the long-term, since it empowers individuals and distributes responsibility across space and place. As the practice of skeuomorphism discussed above emphasised, designs in the Iron Age of East Lothian had long biographies and were flexible and adaptable to different contexts. Furthermore, skills in making and use were in general alienable and interchangeable, and because of this it is argued that social responsibility was distributed amongst individuals in the community.

Similarly, Sofaer (2006) has brought to attention that in Bronze Age Hungary, pottery and bronze crafts shared many methods with building. For example woodworking in building involves scraping and smoothing and these techniques are evident on a large number of pottery sherds, while some vessels were even made by assembling separate pieces together and joining them with a hammering technique also used in making metal vessels and pegs were used to attach clay handles onto clay vessels analogous to wood joinery (ibid.: 132-135). Additionally, sherds were placed in wall foundations and grog was incorporated into the daub used to build the clay ovens (ibid.). Sofaer argues that this is evidence of the networks of relationships which enabled the transfer of know-how across materials and techniques, and that in Bronze Age Hungary this was enabled as part of a caste-like system (ibid.). However, this model of society assumes that crafting was a role carried out by a specific closed group of people. On the other hand, a static stratified society does not seem to be supported by the materiality of Iron Age East Lothian. Rather, a heterarchical model adaptable to varying levels of skill in making, emergent properties through material engagements and the idea of transformation intimately tied up with concepts relating to the agricultural cycle seems most appropriate. Soft materialities and the long biographies of materials may have been involved in important developments in the human life course relating to birth, age, status, gender and death.

Interpreting hierarchical relationships depends on singling out a network of relations to examine. However, it has become clear that the materiality of the south-east Scottish

Iron Age is messy, and it is better to imagine society as a tangle or 'bundle of lines' through which materials flow (Ingold 2007), creating human relationships and identities which can unravel or become more knotted, but which are ultimately difficult to unpick. Heterarchy is defined by Crumley (2005: 39) as "the relationship of elements to one another when they are unranked, or when they possess the potential for being ranked in a number of different ways, depending on systemic requirements". Kinship, age and gender relationships are horizontal in nature, whereas the idea of power which can be bestowed upon any one of these, is hierarchical. Importantly a heterarchy has multiple scales and dimensions, and the hierarchical relations are always in flux (ibid.: 44). This is a helpful way to envision the networks of systemic interactions which make up the materiality of the south-east Scottish Iron Age as it takes account of "fluid", "responsive" and "adaptive...emergence", and the role of the individual in greater society summed up as "individual creativity and collective flexibility" (ibid.: 42). Importantly, heterarchy can only be interpreted and understood when things are examined over time with a fine comb, and this is why the biographical approach taken to examine the materiality of the south-east Scottish Iron Age has been important. It has become evident that social relations were not stable in Iron Age East Lothian; at Broxmouth this is indicated by the exploitation of different resources in different phases (for example, shale and cannel coal-working in Phases 3 and 5), the practice of certain crafts in certain phases (for example copper alloy working in Phase 2 and the hiatus in iron working in Phase 5), and changing networks of engagement (the shift in dominance to Type 2 pottery in later phases are perhaps because of territorial, genealogical or ancestral rights dictating access to resources).

The lack of evidence for centralised production in south-east and central England in the Middle to Late Iron Age, but rather the fragmentary and distributed evidence for iron working, the absence of standardisation and localised smithing has been argued by Ehrenreich to represent a heterarchical craft model, not based on the inalienable knowledge and therefore the power of a few individuals (Ehrenreich 1995). Giles (2007: 400) has, nevertheless, brought to attention the intimate nature and inalienability involved in the Iron Age metal-working process within communities which "touched upon themes vital to social life – sex, death and power – [and] the harnessing of metaphors related to metallurgy could greatly enhance these individuals' political and ritual authority". Metallurgy, it is argued, was a process which made these signative connections thinkable (ibid.). Giles effectively brings to attention the cosmological links between metallurgy, crop cultivation, and food production; ore may have been ground on the quern also used for processing grain (a potentiality noted for the East Lothian querns examined in Chapter 5) and in the bloomery process "the ore (like bread) was left to 'rise' (growing as a spongy 'bloom' on the sides of the furnace) and the slag sank," (Giles 2007: 401). Therefore, ideas of hierarchy and heterarchy are not incompatible, but rather hierarchy can occur within heterarchies enacted through controlled performances of creativity carried out by selected members in the community. In Iron Age East Lothian, it has already become evident that copper alloy and iron working were practiced with skill and knowledge intermittently at only a few sites over the Iron Age, while the intimacy and danger of the bloomery process will have meant it was dictated by a few individuals. Access to copper mines and to tin required for bronzes through long distance exchange may have been controlled by a few communities in the south-east Scottish Iron Age (Chapter 7, Section 7.2). Metallurgy brought together specific individuals to enact beliefs central to Iron Age cosmology. Perhaps the individuals involved in iron-working played pivotal roles in the restructuring of social relations where “new leaders are ‘forged’, young adults ‘tempered’, alliances ‘welded’ together, violence and anger ‘quenched’ through revenge or reparation” (Giles 2007: 406).

“Pulling apart” of social relations has been argued by Giles to be embodied in the genealogical histories of ladder enclosures of Late Iron Age East Yorkshire (Giles 2007b: 240-249). The creation of an agricultural patchwork on the landscape (formed of segmented, demarcated and enclosed plots of land) is argued to be the long term result of the short-fallow system of agriculture, and thus ‘local politics’ of ownership, kinship and sustainability performed at the household level (ibid.: 246). The architecture of these bounded plots “separated the community’s members according to the task in which they were engaged...labour was organised [by] age, gender, skill or position within the family” (ibid.:245). A rejection of the communal was replaced with an emphasis upon “horizontal relations between lineages”. This happened against a background of increasing visibility of violence in the burials of this period and region (ibid.:240, 246). Nevertheless, there are communal threads which bounded these smaller groups together; people ‘flowed’ along and deposited artefacts in the paths between the boundaries (ibid. 242). Therefore, the sustainable heterarchical social relations of south-east Scotland can also be found elsewhere across Iron Age Britain, and has wider implications for how we understand Iron Age Europe.

Presumably there are also areas where social negotiations of power were performed which left little material traces. For example, a remarkably high amount (almost a quarter) of the disarticulated human remains found at Broxmouth had evidence of peri-mortem trauma (Armit et al in prep. 2013), and thus inter-personal violence was likely another way of gaining and asserting power. Disarticulated human fragments were curated in the same way as other materials of worked bone, worked stone, pottery (Roman and indigenous) and metal.

This understanding of society agrees with Herbert's ethnography of metallurgy and pottery in Sub-Saharan Africa where power is enacted through the "mastery of transformative processes", in particular in making pottery and performing metallurgy (Herbert 1993). These are particularly vulnerable, 'brittle' processes (ibid.: 101, 114), and thus attempts to ensure their success were particularly important for heterarchical society. Although in most African societies theoretically anyone can become a smelter, smith or a potter, in practice it was often hereditary or controlled by other kinship relations, while metallurgy was often a male craft and potting a female craft (ibid.: 27-31). Therefore, the system is fundamentally open, though in practice knowledge transfer was predictable. For example, for the Ekonda in Zaïre, a master smelter claimed his position by virtue of his lineage and age, but in fact he lacked the skills and knowledge. He then had to bestow the position of ritual specialist onto another individual, to whom he was related, but who came from another village (ibid.: 61). Above all, anyone who possessed the right skills and knowledge could attain status. Similar networks of relations and know-how transfer would explain the emergence of the general regional traditions of Type 1 and Type 2 pottery in Iron Age East Lothian. Furthermore, in a heterarchical system notions of gender, age and kinship are not necessarily stable (ibid.: 228), and smithing can be understood "as a male appropriation of reproduction" (ibid.: 36) since it includes both female and male counterparts; "the word for the clay tuyère connecting the wooden bellows to the bowl furnace is the same as that for the vagina, but it is modeled on a wooden pole referred to by the term for penis" (ibid.: 37).

These beliefs will have crossed over into other social practices of Iron Age communities. In particular, beliefs linked to fertility of crops, people and animals are argued to be central to the practice of headhunting in Iron Age Europe (Armit 2012). Armit gives many examples of the metaphorical association between the severed head and the success of the agricultural cycle across time and place; in ancient Mayan art the human head and maize are used interchangeably to depict the fertility deity whose mythical decapitation brought about regrowth of the crop, in a Guatamalan village ancestral skulls were paraded around during crucial times in the agricultural cycle, while the Iban from Borneo believe that both the head and the penis were containers of seed which yield agricultural crops and human life (Armit 2012: 57-59, 103). After the decomposition of flesh, one of the skull fragments from Broxmouth (CCC) was modified by the swift swing of a blade (potentially a knife, sickle or sword). This may be a trace of practices of similar beliefs relating to the curation of heads and the enactment of their powers of fertility by the community at Broxmouth, since imagining this act makes obvious visual parallels to the cutting off heads of crops during the harvest (Chapter 4, Section 4.3).

At Broxmouth 60% of the disarticulated human remains found in a variety of ashy midden deposits were from the head, three of which show evidence of trauma occurring at or near time of death (Chapter 4, Section 4.3. The cranial fragments were also better preserved than the other skeletal fragments showing minimal levels of erosion and abrasion and there was also no evidence of gnawing (Armit et al in prep. 2013). This suggests that especially skull fragments had been carefully curated. The Broxmouth skull fragments and their deposition in ashy midden share striking parallels with an example cited by Armit (2012: 69-70) of a frontal fragment from a human skull deposited beneath a ‘phallic’ stone pillar on the top of an ash filled pit situated within a Late Iron Age enclosure at Raffin, County Meath in eastern Ireland. The ash was from the flowering branches of an alder tree, which is often linked to the idea of rebirth in gaelic mythology, thought to be due to the colour change from red to white which occurs when fresh branches are cut (ibid.: 70, Newman et al 2007: 363). Furthermore radiocarbon dates show that the skull fragment had been curated for at least 100 years before its deposition in the 3rd or 4th century AD (ibid.: 70-71). Therefore, cosmologies of fertility were manifested through assembling the substances of ash, reproductive symbols and the head.

As argued for metallurgy (Herbert 1993), headhunting may be understood as a male “appropriation of female productive power” (Armit 2012: 59). Headhunting, in ethnography, is almost exclusively only practiced by males, although the practice of preparation and curating is often carried out by women (ibid.). Bringing a trophy head into the community is believed by the Shuar, from the Amazon, to give women powers which they would then transfer to the crops that they tended (ibid.). Avoiding association with menstrual blood has been noted as a common taboo in ethnographies of pottery and iron smelting (Chapters 6 and 7), leading to the exclusion of women during crucial moments. It may be for the same reasons to ensure agricultural productivity, that headhunting is associated with males (Armit 2012: 57-61). In Iron Age iconography dismembered heads are often carved on phallic pillars, bearded or moustached (e.g. Armit 2012: 115-116, illus. 4.19 to 4.21). Blood and the colour red are re-occurring themes in metallurgy, antler working and headhunting. The practice of headhunting may also be linked with the harvesting of antlers for working at Broxmouth, powerful crowns of male sexual prowess.

In societies in which headhunting has been documented "social power was relatively fluid and rarely passed down through the generations" (Armit 2012: 61). Additionally, greater success at headhunting will often have brought one greater status, but also greater chance of being killed by the enemy (ibid.). Hence, headhunting was another means by which the unpredictability of heterarchical social relationships were maintained by Iron Age societies. In African society possessing authority requires the ability to appropriate both female and male power and to enact ageing through performances of death and rebirth; this makes one responsible for the community's fertility, regeneration and productivity: (ibid.: 228-229). In a similar way, during potting or metallurgy in the "gynecomorphic furnace" (Herbert 1993: 32-55), and potentially during working bone, antler, stone and other crafts; it may be that individuals' social and gender identities were altered or morphed, re-conceptualised and re-born. The Iron Age person's sensitivity to emergent materialities meant that results of working with materials were not predictable, as has been documented in this study of Iron Age south-east Scotland. The creation of power and its transmission were performed through these fluid and unstable relationships with materials, and this continued into the Roman Iron Age.

# Chapter 9 Conclusion

A materiality approach to the materials appropriated, manufactured, used and deposited at Broxmouth and beyond has built up a picture of heterarchical social relationships which were sustained into the Roman Iron Age. Agricultural beliefs of fertility and productivity directed the design of peoples' material worlds.

As discussed, agricultural activities were at the centre of Iron Age life and provided a ready resource for materials. Materials for making artefacts were predominantly sourced, harvested, or manufactured locally. These materials were deliberately kept in use despite their availability from agricultural activities and other sources in the local landscape. This is because identities were tied up with using, making and depositing materials in ways which harnessed fertility, renewal and productivity. There is evidence that middens too were curated, and used as structured abandonment or foundation deposits. Thus, it is probably deliberate that the materials used to make artefacts often ended up in the middens to aid transformation.

The materiality of the south-east Scottish Iron Age was therefore an interconnected whole. The relationships which make up sustainable materialities have to be adaptable according to the complex system of the world, and it has therefore been argued that the sustainable cosmology of the East Lothian Iron Age created and maintained social relationships which were heterarchical in nature. Success and productivity were dependent on the skills of harnessing these materialities, which in turn were responsive to assemblies of materials and their emergent properties. Sustainability can be defined according to principles outlined by Madge (1997: 44-45) to be applied to modern-day design, which include; appreciating humanity's role and impact in the complex system of the world, considering necessities as luxuries, and anticipating and fearing the future. These three principles are found in Iron Age cosmology.

Thus, in Iron Age East Lothian ordinary and predominantly local materialities had extraordinary value and creative powers. Reviews of previous work have shown that the material culture of the northern British Iron Age has been neglected and that studies are blinkered by a focus on diagnostic material typologies, particularly on the arrival of Roman influenced or manufactured objects in the Late Iron Age. However, Late Prehistoric beliefs of fertility and transformation linked to the agricultural cycle manifested in architecture, metallurgy and acts of votive or structured deposition have fascinated scholars (e.g. Bradley 2005, Hill 1995, Parker-Pearson 1999). The majority of material culture with the exception of metallurgy (Giles 2007), however, has often not been thought to add value to interpretation since visually it "muted social differences [and cultural beliefs]" (Parker-Pearson 1999). This viewpoint, however, is a product of a visually based focus on end products. This thesis has shown that when the biographies of everyday materials of worked bone and antler, worked stone and pottery in addition to copper alloy and iron were examined in detail and in comparison with each other, their richness, complexity and new relationships become evident.

Thus, in order to appreciate south-eastern Scotland as an active participant in developments in the wider British, and even European Iron Age, future research must take account of the biographies of supposedly mundane material culture. Examining the biographies of these materials has illuminated Iron Age cosmologies and social relations manifested in appropriation, making, using and deposition. The potential for combining analytical methods with a materiality approach has also become clear and future work of this nature will enrich our understanding of both the physical properties and social role of materials, and the relationships between different traditional categories of materials.

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## Appendix 3: Questionnaire handed out to students who took part in my 'object interaction workshops' held between 2009-2011.

First year archaeology students in their first term at the University of Bradford were asked to handle prehistoric to modern objects and take part in a range of activities, to make us think about issues of design and function without cultural context.

Find Code: Material:

Context Code: Original Finds Category:

**Level of Archaeological Experience:**

**Previous Profession (if any):** **Course:** *e.g. BA arch*

**Draw sketch of object:** (*note any decoration & areas with wear)*

**Is this object complete?:** *Delete as appropriate*

YES/ NO/ UNKNOWN

**Rate the value of this object.** *H= high, M= medium, L= low*

| | Everyday | Special |
|---|---|---|
| **Value** | | |
| **Justification** *e.g. special if decorated or personal* | | |

***Which were chosen as valued qualities for this object?*** *H= high, M= medium, L= low, & write a couple of sentences on why you have rated each as high, medium or low*

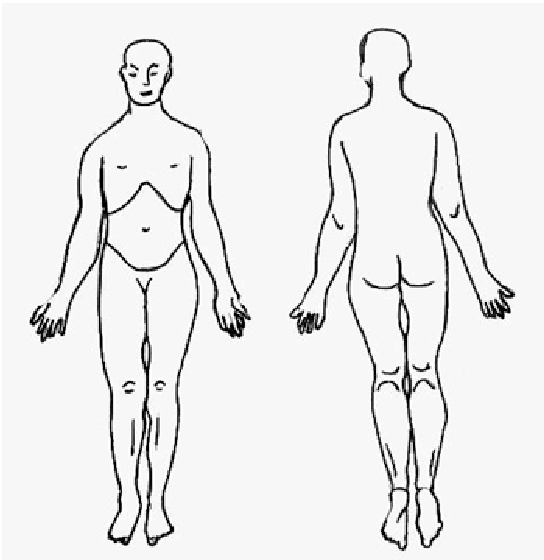
| | Material | Hardnes s | Toughne ss | Weigh t | Texture | Colour | Any Other Special Properties |
|---|---|---|---|---|---|---|---|
| **Quality** | | | | | | | |
| **Justificatio n** *e.g. High level hardness for force against other hard material, e.g as hammer* | | | | | | | |

**What do you think was valued in the design for this object?** *H= high, M= medium, L= low, & write a couple of sentences on why you have rated each as high, medium or low*

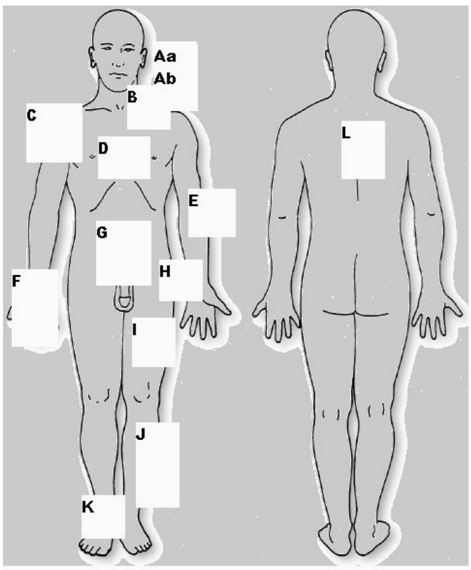
| | Functio n | Look & Feel | Static | Portabl e | Tempora ry | Durabl e | Adaptab le | Other Design Factors | |
|---|---|---|---|---|---|---|---|---|---|
| **Quality** | | | | | | | | H/ M/L | *e.g. weighte d* |

| | Function | Look & Feel | Static | Portable | Temporary | Durable | Adaptable | Other Design Factors |
|---|---|---|---|---|---|---|---|---|
| **Justification** *e.g. temporary because disposable & easily degradable* | | | | | | | | |

**<u>How Worn/Used?:</u>** *Draw on body how worn or used (show if part of composite object)*



**Muscles used:** *circle*      A B C D E F G H I J K L




**KEY:**
**Aa occulatory**
**Ab masticatory**
**B neck**
**C rotator Cuff**
**D chest, pectoral**
**E arm & forarm**
**F wrist & hand**
**G abdomen**
**H hip, soas**
**I quadriceps**
**J patellar ligament, patella to tibia**
**K ankle & foot**
**L lumbar, spine**

**In considering all of the above, how do you think this object was used?:**

**In what category would you put this object?:** *tick as many as you like*

| | | | |
|---|---|---|---|
| Tool | | Polisher | |
| Ornament | | Hone | |
| Jewellery | | Whorl | |
| Pottery | | Block | |
| Craft Equipment | | Mould | |
| Manufacture Waste | | Stone Ball | |
| Handle | | Quern | |
| Point | | Mortar | |
| Socketed Point | | Muller | |
| Fine Bone Point | | Cupped Stone | |
| Robust Point | | Utilised Fragment | |
| Short Point | | Rough-outs | |
| Splinter | | Partially Worked | |
| Bangle | | Artefactual Ceramic | |
| Pin | | Structural Ceramic | |
| Needle | | **Other** | *What?* |

# Appendix 4: List of RadioCarbon dates by Phase (1-6) from the Broxmouth Hillfort Project (Armit and McKenzie in prep. 2013).

*First phase (1980s) Broxmouth dates have brown fill*

*Phase 1*

| SUERC code | GU code | Age BP | | D13c | D15n | C:N | Context | Description | Material |
|---|---|---|---|---|---|---|---|---|---|
| No SUERC code | GU-1198 | 3770 | 250 | -25%* | | * | JCN F6 | Fill of stockade construction trench | charcoal |
| No SUERC code | GU-1358 | 2375 | 60 | -19.70%* | | * | OCY | Midden interleaved between Phase 2 and Phase 3 houses of Period II | animal bone |
| SUERC-24258 | GU-18736 | 2480 | 30 | -20.6‰ | 10.6‰ | 3.3 | OAN | Cranial fragment from soil sealing early houses and yard | human bone |
| SUERC-33740 | GU-23621 | 2515 | 30 | -22.0‰ | 7.5‰ | 3.3 | JCN | Palisade trench to south of House 6 | animal bone |
| SUERC-33741 | GU-23622 | 2530 | 30 | -22.1‰ | 4.8‰ | 3.2 | JCN | Palisade trench to south of House 6 | animal bone |
| SUERC-35084 | GU-24364 | 2530 | 35 | -22.3‰ | 5.7‰ | 3.2 | OBJ | Earliest ditch | animal bone |
| SUERC-35085 | GU-24365 | 2465 | 35 | -22.2‰ | 6.3‰ | 3.2 | OBJ | Earliest ditch | animal bone |
| SUERC-35086 | GU-24366 | 2480 | 35 | -21.9‰ | 1.9‰ | 3.2 | OFM03 | Soil sealing earliest House | animal bone |
| SUERC-35087 | GU-24367 | 2430 | 35 | -22.4‰ | 6.1‰ | 3.2 | OFM03 | Soil sealing earliest House | animal bone |
| SUERC-35091 | GU-24368 | 2440 | 35 | -20.2‰ | 10.8‰ | 3.2 | OBR | Slot trench of later of earlier Houses | animal bone |
| SUERC-35092 | GU-24369 | 2480 | 35 | -22.3‰ | 5.5‰ | 3.3 | OAN | Soil sealing early houses and yard | animal bone |
| SUERC-35093 | GU-24370 | 2415 | 35 | -22.0‰ | 8.6‰ | 3.2 | OAN | Soil sealing early houses and yard | animal bone |

*Phase 2*

| SUERC code | GU code | Age BP | | D13c | D15n | C:N | Context | Description | Material |
|---|---|---|---|---|---|---|---|---|---|
| No SUERC code | GU-1140 | 2270 | 65 | -20.70%* | | * | CAA/EAF | Interior: burial 1 | human bone |
| No SUERC code | GU-1201 | 2470 | 65 | -25%* | | * | OAH | Burnt post in lateral revetment of Period III gateway | charcoal |
| No SUERC code | GU-1359 | 2380 | 55 | -19.80%* | | * | OAZ | Midden scatter on metalled surface of Period III gateway | animal bone |
| No SUERC code | GU-1502 | 2570 | 60* | * | | * | OBE | Midden scatter from soil over derelict intermediate phase Inner Rampart of Period III | animal bone |
| SUERC 21988 | GU-17922 | 2395 | 30 | -20.7‰ | 11.9‰ | 3.4 | CAA/EAF | Interior: burial 1 | human bone |
| SUERC-24246 | GU-18727 | 2430 | 30 | -20.6‰ | 11.3‰ | 3.3 | DKZ/DIE | Interior: burial 2 | human bone |
| SUERC-35094 | GU-24371 | 2510 | 35 | -22.0‰ | 5.7‰ | 3.2 | ODZ | Posthole in gateway structure | animal bone |
| SUERC-35095 | GU-24372 | 2430 | 35 | -22.4‰ | 7.1‰ | 3.2 | ODZ | Posthole in gateway structure | animal bone |
| SUERC-35096 | GU-24373 | 2445 | 35 | -21.6‰ | 5.7‰ | 3.2 | OAZ | Metalled surface associated with gateway structure | animal bone |

*Phase 3*

| SUERC code | GU code | Age BP | | D13c | D15n | C:N | Context | Description | Material |
|---|---|---|---|---|---|---|---|---|---|
| No SUERC code | GU-1070 | 2180 | 60 | -21.30%* | | * | BBF01 | Midden in upper fill of PIV/VII Outer Ditch | animal bone |
| No SUERC code | GU-1197 | 2320 | 60 | -25.00%* | | * | BBC07 | Basal midden in Period VI Middle Ditch | charcoal |
| No SUERC code | GU-1205 | 2295 | 50 | -24.80%* | | * | BCQ01 | Possible rampart strapping from collapsed, burnt rampart of Period VI | charcoal |
| No SUERC code | GU-1225 | 2250 | 55 | -25.10%* | | * | BEX | Burnt post of timber revetment to Period VI Middle Rampart | charcoal |
| No SUERC code | GU-1227 | 1850 | 250 | -25%* | | * | BBJ04 | Intermediate fill of Period IV cut of Inner Ditch | charcoal |
| SUERC-35097 | GU-24374 | 2245 | 35 | -22.2‰ | 4.7‰ | 3.2 | OBD | Inner Ditch infill | animal bone |
| SUERC-35101 | GU-24375 | 2195 | 35 | -21.8‰ | 5.5‰ | 3.2 | OBD | Inner Ditch infill | animal bone |
| SUERC-36087 | GU-25005 | 2285 | 30 | -21.6‰ | 6.4‰ | 3.2 | BBJ08 | Initial deliberate infill into ditch BBJ (Inner Ditch) | animal bone |
| SUERC-36088 | GU-25006 | 2275 | 30 | -22.2‰ | 5.0‰ | 3.2 | BLY | Infill into Inner Ditch at South West Entrance | animal bone |
| SUERC-36091 | GU-25009 | 2500 | 30 | -21.9‰ | 5.7‰ | 3.2 | BKZ | Gully within gateway structure at South West Entrance | animal bone |
| SUERC-36092 | GU-25010 | 2445 | 30 | -22.3‰ | 5.7‰ | 3.2 | BJD | Gully within gateway structure at South West Entrance | animal bone |
| SUERC-36093 | GU-25011 | 2325 | 30 | -21.7‰ | 6.2‰ | 3.2 | BBA07 | Initial deliberate infill into ditch BBA (Middle Ditch) | animal bone |
| SUERC-36097 | GU-25012 | 2280 | 30 | -22.1‰ | 6.2‰ | 3.3 | BBA02 | Penultimate deliberate infill into ditch BBA (Middle Ditch) | animal bone |
| SUERC-36098 | GU-25013 | 2305 | 30 | -22.3‰ | 5.4‰ | 3.2 | BBC03 | Deliberate infill within upper fill of ditch BBC (Middle Ditch) | animal bone |
| SUERC-36099 | GU-25014 | 2275 | 30 | -21.0‰ | 6.7‰ | 3.2 | BDM03/BBC | Burning-related deposit within upper fill of ditch BBC (Middle Ditch) | animal bone |
| SUERC-36100 | GU-25015 | 2265 | 30 | -22.1‰ | 6.3‰ | 3.2 | BBC01 | Uppermost deliberate infill/sealing midden deposit into ditch BBC (Middle Ditch) | animal bone |
| SUERC-36101 | GU-25016 | 2300 | 30 | -22.0‰ | 5.4‰ | 3.2 | BBD07 | Potential 'special' deposit into ditch BBD (Outer Ditch) | animal bone |
| SUERC-36102 | GU-25017 | 2030 | 30 | -21.3‰ | 6.4‰ | 3.3 | BBF05 | Deliberate infill within fill of ditch BBF (Outer Ditch) | animal bone |
| SUERC-36103 | GU-25018 | 2195 | 30 | -22.0‰ | 5.6‰ | 3.2 | BGZ | Posthole within fence line construction flanking Middle Ditch eastern terminal BBC | animal bone |
| SUERC-36107 | GU-25019 | 2395 | 30 | -21.0‰ | 9.6‰ | 3.3 | BDZ | Posthole within fence line construction flanking Middle Ditch western terminal BBA | animal bone |

*Phase 3/4*

| SUERC code | GU code | Age BP | | D13c | D15n | C:N | Context | Description | Material |
|---|---|---|---|---|---|---|---|---|---|
| No SUERC code | GU-1199 | 2105 | 50 | -25%* | | * | BAB | Possibly intrusive fill of putatively Period VII posthole at Southwest | charcoal |
| No SUERC code | GU-1202 | 2520 | 55 | -25%* | | * | BJY | Charcoal from sill-beam slot in Period VI/VII gate (?) structure | charcoal |
| No SUERC code | GU-1226 | 2145 | 70 | -25%* | | * | BKC | Midden associated with putative gateways of Period VI/VII | charcoal |
| SUERC-36089 | GU-25007 | 2270 | 30 | -21.9‰ | 6.5‰ | 3.4 | BLS | Sheep skeleton deposit into activity within infilled Inner Ditch at SWEntrance | animal bone |
| SUERC-36090 | GU-25008 | 2250 | 30 | -21.9‰ | 6.5‰ | 3.4 | BLA | Lamb skeleton deposit into activity within infilled Inner Ditch at SWEntrance | animal bone |

*Phase 3/6*

| SUERC code | GU code | Age BP | D13c | D15n | C:N | Context | Description | Material |
|---|---|---|---|---|---|---|---|---|
| SUERC-36112 | GU-25024 | 2465 | 30 -21.8‰ | 5.4‰ | 3.3 | OCH | Shelly deposit within Quarry Scoop (OBW) infill sequence | animal bone |

*Phase 4*

| SUERC code | GU code | Age BP | D13c | D15n | C:N | Context | Description | Material |
|---|---|---|---|---|---|---|---|---|
| SUERC-35102 | GU-24376 | 2240 | 35 -22.1‰ | 5.5‰ | 3.2 | CDC | STR. C: Central hearth | animal bone |
| SUERC-35103 | GU-24377 | 2235 | 35 -22.5‰ | 9.7‰ | 3.3 | CDC | STR. C: Central hearth | animal bone |
| SUERC-35104 | GU-24378 | 2285 | 35 -22.6‰ | 5.6‰ | 3.2 | CCW | STR. C: Pit in upper part of Str. C | animal bone |
| SUERC-35105 | GU-24379 | 2215 | 35 -22.2‰ | 6.9‰ | 3.2 | CCW | STR. C: Pit in upper part of Str. C | animal bone |
| SUERC-35112 | GU-24383 | 2225 | 35 -22.3‰ | 6.5‰ | 3.2 | CHC | STR. F: Main hearth | animal bone |
| SUERC-35113 | GU-24384 | 2255 | 35 -21.7‰ | 6.2‰ | 3.2 | CHC | STR. F: Main hearth | animal bone |
| SUERC-35114 | GU-24385 | 2155 | 35 -21.5‰ | 6.2‰ | 3.2 | CGW1 | STR. F: Layer within secondary hearth sequence | animal bone |
| SUERC-35115 | GU-24386 | 2175 | 35 -22.0‰ | 3.1‰ | 3.2 | CGW1 | STR. F: Layer within secondary hearth sequence | animal bone |
| SUERC-35116 | GU-24387 | 2005 | 35 -21.1‰ | 7.1‰ | 3.3 | CGL | STR. F: Gravel overlying paving in Str. F upper | animal bone |
| SUERC-35117 | GU-24388 | 2185 | 35 -21.8‰ | 6.8‰ | 3.2 | CGL | STR. F: Gravel overlying paving in Str. F upper | animal bone |

*Phase 5*

| SUERC code | GU code | Age BP | D13c | D15n | C:N | Context | Description | Material |
|---|---|---|---|---|---|---|---|---|
| No SUERC code | GU-1138 | 2255 | 70 -19.90% | * | * | KAC/MAC | Cemetery: burial 7 | human bone |
| No SUERC code | GU-1139 | 2155 | 60 -20.30% | * | * | KAE/MAQ | Cemetery: burial 9 | human bone |
| No SUERC code | GU-1141 | 2160 | 60 -20.60% | * | * | CAH/MAT | Cemetery: burial 12 | human bone |
| No SUERC code | GU-1143 | 2020 | 65 -20.80% | * | * | KAI/MAV | Cemetery: burial 13 | human bone |
| No SUERC code | GU-1144 | 2200 | 65 -20.50% | * | * | FBP/BBO | South-West Entrance: burial (3) under Period VII roadway | human bone |
| No SUERC code | GU-1145 | 2060 | 60 -20.10% | * | * | KAF/MAO | Cemetery: burial 10 | human bone |
| No SUERC code | GU-1146 | 2145 | 60 -20.40% | * | * | KAG/MAR | Cemetery: burial 11 | human bone |
| No SUERC code | GU-1357 | 2155 | 55 -20.50% | * | * | CBD01 | Lower midden overlying houses in upper fill of derelict Period IV cut of Inner Ditch | animal bone |
| No SUERC code | GU-1360 | 2095 | 95 -20.20% | * | * | CBS | Midden scatter on pebbled surface in the stratified sequence in upper fill of derelict I | animal bone |
| No SUERC code | GU-1500 | 2395 | 140 * | * | * | CBJ | Lower midden deposit in upper fill of derelict Period IV cut of Inner Ditch | animal bone |
| No SUERC code | GU-1501 | 2365 | 80 * | * | * | OAD | Midden deposit in soil over derelict Period IV Inner Rampart | animal bone |
| SUERC 21990 | GU-17924 | 2180 | 30 -20.7‰ | 11.3‰ | 3.4 | KAC | Cemetery: burial 7 | human bone |
| SUERC 21991 | GU-17925 | 2130 | 30 -20.9‰ | 10.7‰ | 3.8 | KAF | Cemetery: burial 10 | human bone |
| SUERC-24247 | GU-18728 | 2175 | 30 -20.7‰ | 10.5‰ | 3.3 | FBP/BBO | Interior: burial 3 | human bone |
| SUERC-24248 | GU-18729 | 2095 | 30 -20.5‰ | 10.6‰ | 3.4 | KAA | Cemetery: burial 5 | human bone |
| SUERC-24249 | GU-18730 | 2150 | 30 -20.9‰ | 9.5‰ | 3.6 | KAB | Cemetery: burial 6 | human bone |
| SUERC-24250 | GU-18731 | 2155 | 30 -20.8‰ | 10.9‰ | 3.3 | KAE | Cemetery: burial 9 | human bone |
| SUERC-24251 | GU-18732 | 2110 | 30 -20.7‰ | 10.7‰ | 3.3 | KAG | Cemetery: burial 11 | human bone |
| SUERC-24252 | GU-18733 | 2180 | 30 -20.4‰ | 10.3‰ | 3.3 | KAH | Cemetery: burial 12 | human bone |
| SUERC-24256 | GU-18734 | 2215 | 30 -20.7‰ | 10.6‰ | 3.4 | KAI | Cemetery: burial 13 | human bone |
| SUERC-24257 | GU-18735 | 2135 | 30 -20.2‰ | 9.9‰ | 3.5 | KAF | Cemetery: burial 14 | human bone |
| SUERC-24262 | GU-18740 | 2260 | 30 -20.6‰ | 10.7‰ | 3.2 | CBJ | Human bone fragment from bone-rich midden in Inner Ditch | human bone |
| SUERC-35106 | GU-24380 | 2240 | 35 -21.7‰ | 7.5‰ | 3.3 | CBD01 | Midden immediately sealing Str.C | animal bone |
| SUERC-35107 | GU-24381 | 2290 | 35 -20.9‰ | 4.2‰ | 3.2 | CBD01 | Midden immediately sealing Str.C | animal bone |
| SUERC-35111 | GU-24382 | 2135 | 35 -21.4‰ | 6.6‰ | 3.2 | CBJ | Bone-rich midden sealing CBD | animal bone |
| SUERC-35121 | GU-24389 | 2095 | 40 -22.2‰ | 5.0‰ | 3.4 | CBS | Midden sealing Str. F. | animal bone |
| SUERC-35122 | GU-24390 | 2330 | 35 -22.1‰ | 6.2‰ | 3.2 | CBS | Midden sealing Str. F. | animal bone |
| SUERC-35123 | GU-24391 | 2320 | 35 -22.0‰ | 6.6‰ | 3.2 | CBQ | Midden sealing CBS | animal bone |
| SUERC-35124 | GU-24392 | 2080 | 35 -21.9‰ | 6.7‰ | 3.2 | CBQ | Midden sealing CBS | animal bone |
| SUERC-35125 | GU-24393 | 2345 | 35 -23.2‰ | 7.9‰ | 3.3 | CBM | Midden sealing Str. D (not dated) and sealed by CBN. Possibly (= CBS) and (= CBD | animal bone |
| SUERC-35126 | GU-24394 | 2320 | 35 -22.4‰ | 5.1‰ | 3.2 | CBM | Midden sealing Str. D (not dated) and sealed by CBN. Possibly (= CBS) and (= CBD | animal bone |

*Phase 5/6*

| SUERC code | GU code | Age BP | D13c | D15n | C:N | Context | Description | Material |
|---|---|---|---|---|---|---|---|---|
| No SUERC code | GU-1505 | 2005 | 60 * | * | * | BCB/BGG | Midden scatter from deposit between pebbling of Period VII roadway and overlying | animal bone |
| No SUERC code | GU-1503 | 2095 | 70 * | * | * | BCC | Midden from rubble overlying Period VII metalled roadway | animal bone |
| No SUERC code | GU-1504 | 1980 | 85 * | * | * | BFD01 | Midden scatter from rough cobbling over Period VII pebbled roadway | animal bone |
| SUERC-24260 | GU-18738 | 2245 | 30 -22.2‰ | 11.0‰ | 3.2 | None | Cranial fragment from 'Inner Ditch Occupation area' (context retrospectively identifie | human bone |
| SUERC-35127 | GU-24395 | 2210 | 35 -22.2‰ | 5.3‰ | 3.2 | CBN | Midden deposit within uppermost midden CAM | animal bone |
| SUERC-35131 | GU-24396 | 2260 | 35 -22.1‰ | 5.5‰ | 3.2 | CBN | Midden deposit within uppermost midden CAM | animal bone |
| SUERC-35132 | GU-24397 | 2800 | 35 -22.1‰ | 4.1‰ | 3.2 | CAO | Cobbling within uppermost midden CAM | animal bone |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SUERC-35133 | GU-24398 | 2135 | 35 | -21.6‰ | 5.8‰ | 3.4 | CAO | Cobbling within uppermost midden CAM | animal bone |
| SUERC-36108 | GU-25020 | 2485 | 30 | -21.8‰ | 7.7‰ | 3.2 | BFC | Pebbled roadway at south end of South West Entrance | animal bone |
| SUERC-36109 | GU-25021 | 1885 | 30 | -22.4‰ | 5.3‰ | 3.2 | BFC | Pebbled roadway at south end of South West Entrance | animal bone |
| SUERC-36110 | GU-25022 | 1860 | 30 | -21.7‰ | 5.7‰ | 3.2 | BGG | Pebbled roadway at north end of South West Entrance | animal bone |
| SUERC-36111 | GU-25023 | 2245 | 30 | -21.5‰ | 6.6‰ | 3.2 | BAX | Rubble midden deposit sealing pebble roadway in South West Entrance | animal bone |

*Phase 6*

| SUERC code | GU code | Age BP | | D13c | D15n | C:N | Context | Description | Material |
|---|---|---|---|---|---|---|---|---|---|
| No SUERC code | GU-1069 | 1740 | 70 | -20.80% | * | * | None | Midden on floor of stone-built House 5 | animal bone |
| No SUERC code | GU-1206 | 2045 | 105 | -25% | * | * | JIU02 | From hearth of secondary stone-built house in Area 4 (House 4) | charcoal |
| No SUERC code | GU-1361 | 2335 | 65 | -19.70% | * | * | JCN AP2.2 | Securely stratified fill of stockade construction trench | animal bone |
| No SUERC code | GU-1497 | 2005 | 60 | * | * | * | ZONE T' | Midden infill of derelict stone-built house in Area 7 | animal bone |
| No SUERC code | GU-1498 | 2050 | 100 | * | * | * | JAB | Small rubbish deposit underlying penultimate wall of multi-phase stone-built house i | animal bone |
| No SUERC code | GU-1499 | 2030 | 60 | * | * | * | ZONE F' | Midden infill of derelict timber-built house in Area 3 | animal bone |
| SUERC-24259 | GU-18737 | 1970 | 30 | -20.6‰ | 12.0‰ | 3.2 | None | Cranial fragment from midden below walling within House 4 | human bone |
| SUERC-24261 | GU-18739 | 1950 | 30 | -20.7‰ | 10.8‰ | 3.3 | HAB02 | Cranial fragment from House 7 | human bone |
| SUERC-30943 | GU-22204 | 2405 | 30 | -21.9‰ | 5.9‰ | 3.3 | DFP | House 2: slot | animal bone |
| SUERC-30944 | GU-22205 | 1855 | 30 | -22.3‰ | 5.8‰ | 3.6 | DFP | House 2: slot | animal bone |
| SUERC-30945 | GU-22206 | 1810 | 30 | -22.4‰ | 6.4‰ | 3.7 | DBO | House 2: terminal posthole in west of wall-slot | animal bone |
| SUERC-30946 | GU-22207 | 1860 | 30 | -21.4‰ | 6.7‰ | 3.3 | DBO | House 2: terminal posthole in west of wall-slot | animal bone |
| SUERC-30947 | GU-22208 | 1950 | 30 | -21.9‰ | 7.0‰ | 3.4 | DGX02 | House 2: clay-lined pit with slabbed base in far north-west | animal bone |
| SUERC-30951 | GU-22209 | 1765 | 35 | -16.6‰ | n/a | n/a | DGX01 | House 2: clay-lined pit with slabbed base in far north-west | animal bone |
| SUERC-30952 | GU-22210 | 1930 | 35 | -21.7‰ | 5.2‰ | 3.2 | DEA01 | House 2: pit to SE containing Type II pottery | animal bone |
| SUERC-30953 | GU-22211 | 2010 | 30 | -21.4‰ | 6.6‰ | 3.2 | DEA01 | House 2: pit to SE containing Type II pottery | animal bone |
| SUERC-33358 | GU-23350 | 2135 | 30 | -22.7‰ | 8.3‰ | 3.3 | JFV | House 3: posthole to north | animal bone |
| SUERC-33359 | GU-23351 | 1895 | 30 | -21.3‰ | 5.3‰ | 3.3 | JIS | House 4: pit associated with earliest occupation | animal bone |
| SUERC-33360 | GU-23352 | 2255 | 30 | -21.4‰ | 5.2‰ | 3.2 | JIS | House 4: pit associated with earliest occupation | animal bone |
| SUERC-33361 | GU-23353 | 2085 | 30 | -21.4‰ | 6.2‰ | 3.3 | JDL-JDM | House 4: 'double-skinned' wall associated with primary occupation | animal bone |
| SUERC-33362 | GU-23354 | 2100 | 30 | -21.4‰ | 5.2‰ | 3.3 | JDL-JDM | House 4: 'double-skinned' wall associated with primary occupation | animal bone |
| SUERC-33363 | GU-23355 | 1915 | 30 | -21.6‰ | 3.8‰ | 3.4 | JEL/JEM | House 4: deposit between primary and secondary paving | animal bone |
| SUERC-33364 | GU-23356 | 2135 | 30 | -22.8‰ | 5.9‰ | 3.3 | JAB | House 4: terminal midden infill | animal bone |
| SUERC-33368 | GU-23357 | 2270 | 30 | -21.8‰ | 7.2‰ | 3.3 | JAB | House 4: terminal midden infill | animal bone |
| SUERC-33369 | GU-23358 | 1920 | 30 | -21.7‰ | 6.1‰ | 3.2 | Sealed behind wall/against scoop | House 5: scoop and revetment wall - first phase | animal bone |
| SUERC-33370 | GU-23359 | 1920 | 30 | -21.9‰ | 5.9‰ | 3.3 | Sealed behind wall/against scoop | House 5: scoop and revetment wall - first phase | animal bone |
| SUERC-33371 | GU-23360 | 1910 | 30 | -22.5‰ | 7.6‰ | 3.3 | Bone from under house floor | House 5: material from pre-paved phase | animal bone |
| SUERC-33372 | GU-23361 | 1930 | 30 | -21.4‰ | 3.0‰ | 3.3 | JAC under paving | House 5: material from pre-paved phase | animal bone |
| SUERC-33373 | GU-23362 | 1865 | 30 | -21.6‰ | 6.9‰ | 3.3 | DIA - final infill | House 5: terminal infill | animal bone |
| SUERC-33374 | GU-23363 | 1825 | 30 | -21.9‰ | 8.2‰ | 3.4 | DIA - final infill | House 5: terminal infill | animal bone |
| SUERC-33738 | GU-23619 | 2030 | 30 | -21.1‰ | 5.4‰ | 3.2 | JCP | House 6: inner ring-groove | animal bone |
| SUERC-33739 | GU-23620 | 2060 | 30 | -21.0‰ | 5.7‰ | 3.2 | JCP | House 6: inner ring-groove | animal bone |
| SUERC-33742 | GU-23623 | 1930 | 30 | -21.4‰ | 7.7‰ | 3.2 | JCW02 | Pit to SW of palisade trench and House 6 | animal bone |
| SUERC-33746 | GU-23624 | 1930 | 30 | -21.6‰ | 7.1‰ | 3.3 | JCW01 | Pit to SW of palisade trench and House 6 | animal bone |
| SUERC-33747 | GU-23625 | 3345 | 30 | -24.2‰ | 5.2‰ | 3.3 | JCR | Pit to S of House 6 near western terminus of palisade trench | animal bone |
| SUERC-33748 | GU-23626 | 1985 | 30 | -22.7‰ | 7.7‰ | 3.3 | JCR | Pit to S of House 6 near western terminus of palisade trench | animal bone |
| SUERC-33749 | GU-23627 | 2030 | 30 | -21.6‰ | 10.0‰ | 3.3 | HAE | House 7: large posthole at east facing entrance | animal bone |
| SUERC-33750 | GU-23628 | 2070 | 30 | -21.8‰ | 7.6‰ | 3.3 | HAE | House 7: large posthole at east facing entrance | animal bone |
| SUERC-33751 | GU-23629 | 1960 | 30 | -22.2‰ | 5.1‰ | 3.3 | HDS03 | House 7: largest pit, pre-paved phase | animal bone |
| SUERC-33752 | GU-23630 | 1935 | 30 | -21.8‰ | 7.6‰ | 3.3 | HDS03 | House 7: largest pit, pre-paved phase | animal bone |
| SUERC-0 | GU-23631 | FAIL | n/a | n/a | n/a | n/a | HBS | House 7: hearth associated with secondary paving | animal bone |
| SUERC-0 | GU-23632 | FAIL | n/a | n/a | n/a | n/a | HBS | House 7: hearth associated with secondary paving | animal bone |
| SUERC-33756 | GU-23633 | 1965 | 30 | -22.0‰ | 5.8‰ | 3.2 | HCF | House 7: wall core material | animal bone |
| SUERC-33757 | GU-23634 | 1955 | 30 | -22.2‰ | 4.8‰ | 3.3 | HCF | House 7: wall core material | animal bone |
| SUERC-36067 | GU-24991 | 1890 | 30 | -22.0‰ | 6.5‰ | 3.2 | HIA | Area 8 - area of roughly circular paving | animal bone |
| SUERC-36068 | GU-24992 | 2040 | 30 | -22.4‰ | 6.5‰ | 3.2 | HIM | Area 8 - slot trench | animal bone |
| SUERC-36069 | GU-24993 | 1910 | 30 | -22.6‰ | 8.1‰ | 3.2 | HIM | Area 8 - slot trench | animal bone |
| SUERC-36070 | GU-24994 | 2095 | 30 | -20.9‰ | 3.1‰ | 3.2 | HIE | Area 8 - cobbling sealed by EBO | animal bone |
| SUERC-36071 | GU-24995 | 1955 | 30 | -21.7‰ | 7.3‰ | 3.3 | HIE | Area 8 - cobbling sealed by EBO | animal bone |
| SUERC-36072 | GU-24996 | 1880 | 30 | -22.1‰ | 6.5‰ | 3.3 | EBO | Area 8 - paving sealing HIE | animal bone |
| SUERC-36073 | GU-24997 | 2415 | 30 | -21.8‰ | 5.6‰ | 3.2 | KDW05 | Putative soil sealing Quarry Scoop infills (=OAD, House 1 Layer 5) | animal bone |
| SUERC-36077 | GU-24998 | 2000 | 30 | -21.6‰ | 6.5‰ | 3.3 | House 1 Layer 4 | House 1 Layer 4 | animal bone |
| SUERC-36078 | GU-24999 | 1845 | 30 | -22.4‰ | 7.3‰ | 3.2 | House 1 Layer 3 | House 1 Layer 3 | animal bone |
| SUERC-36079 | GU-25000 | 1790 | 30 | -22.5‰ | 7.2‰ | 3.6 | KAT | Hearth in House 1 | animal bone |
| SUERC-36080 | GU-25001 | 2115 | 30 | -22.1‰ | 6.9‰ | 3.3 | KAS | House 1 Layer 2 | animal bone |
| SUERC-36081 | GU-25002 | 2175 | 30 | -21.9‰ | 5.9‰ | 3.3 | KAS | House 1 Layer 2 | animal bone |
| SUERC-36082 | GU-25003 | 2275 | 30 | -21.9‰ | 4.4‰ | 3.2 | KEM04 | Pit 6 in House 1 | animal bone |
| SUERC-36083 | GU-25004 | 1940 | 30 | -22.4‰ | 8.8‰ | 3.2 | KEM04 | Pit 6 in House 1 | animal bone |

# Appendix 5: All worked bone and antler from East Lothian which have been decorated or deliberately altered in colour.

| Site | Find Code | Find Description | Context | Decoration |
|---|---|---|---|---|
| Broxmouth | CGH(2) | Fragment of antler tine. Decorated with shallow irregular grooves in the form of a St. Andrews cross contained within three parallel lines. The outer surface is smooth and slightly polished. Length: 45 mm. | In secondary infill of abandoned House 4, Phase 6 | Cross and parallel lines |
| Broxmouth | ELL | Large antler tine, pear shaped in cross section, and transversely perforated at base. Pear shaped socket has been channelled into the cancellous bone (54 mm long). Surface well polished and bears longitudinal striations. | CBJ midden sealing occupation in Phase 5 | Blackened |
| Broxmouth | EMI | Long handled comb, antler. Rough exterior surface of antler has been removed and the exposed surface is abraded. It has a pronounced curve in cross section and a perforated fishtail end. Two roughly parallel lines enclose the perforation. There are two incised lines at the base of the dention. The nine teeth are closely set, of irregular thickness and length (average 35 mm). The tips of the teeth form an unbroken line across the breadth of the comb unlike the interdental notches which are staggered. the tips of the teeth are polished. Length: 118 mm. Breadth at dental end: 37 mm. | Pit in area of abandonned House 6, Phase 6 | Parallel lines<br><br>Blackened |
| Broxmouth | ENM | Yoke-Shafted and slightly humpbacked pin. Decorated by two incised lines around flat topped pinhead. Shank tapers to fine point and has oval section. Displays general polish. Length: 59 mm. | CBM midden sealing occupation in Phase 5 | Parallel lines |

| Site | Find Code | Find Description | Context | Decoration |
|---|---|---|---|---|
| Broxmouth | GDC | Small antler drum, probably tine. Ornamented with eight concentric double rings (5 mm and 10 mm respectively) with central dots. The motif is very regular and is the result of compass work. One end is bevelled and worn, the other is sawn and shows no sign of wear. The outer surface is smooth and polished and one of the ring motifs has been disproportionately worn. The cancellous bone has been removed leaving a socket 13 mm in diameter. The object is probably an offcut from a larger artefact. Length: 22 mm. | CET in Inner Ditch occupation area, deposit over paving, Phase 4 | Ring and dot, pigment |
| Broxmouth | GNN & GNE | Antler tine. Broken longitudinally and at one end. The hilt is sawn and bears four distinctive incised 'U' shaped lines. The cancellous bone has been channelled within 36 mm of hilt. Length: 53 mm. | In rampart gravels in Phase 2 | Parallel lines |
| Broxmouth | FXB | Ringheaded bone pin. Broken after second bend in shaft. Head decorated on both sides with radiating incised lines, incised "X" on bend in shaft. Shaft abraded. Displays general polish. Skeuomorph of metal ringheaded pins. | Floor of structure C, in occupation in Phase 4 | Cross and radiating lines |
| Broxmouth | EXA | Decorated antler ring. Cancellous bone removed. Two transverse slots one at each side cut through the ring. Areas between the two slots are decorated with incised crosses. These are contained within two incised grooves running round the ring. The outer surface is polished and the inside of the ring worn and polished. Is a skeuomorph of metal spiral rings. Diameter: 32 mm. | Midden in South West Entrance in Phase 3 | Cross |

| Site | Find Code | Find Description | Context | Decoration |
|---|---|---|---|---|
| Broxmouth | BST | Broken artefact made from compact bone of antler. It has rounded shaft tapering at both ends which are decorated with double incised grooves. One end is blunted and worn, the other is broken and unworn. The object is covered in striations and is slightly polished. Length: 57 mm. | In soil in House 1, Phase 1 | Parallel lines |
| Broxmouth | DKW | Antler pedicle dome (height 18 mm. diameter 32 mm) Dome is smooth and all surfaces are highly polished just slightly over half of the dome is blackened, possibly by burning. Perhaps a deliberate attempt at decoration. | In middens between walls JDM/ JDN in House 4, Phase 6 | Blackened |
| Broxmouth | EIX | Bone. Handle is pointed, shaft slightly swollen. Scoop of spoon is squared and has a curved section. The back of the spoon is decorated by a Vshaped incised chevron. The shaft and back of the spoon are covered in manufacture striations. The lip of the spoon is slightly polished and the object displays general lustre.Length: 88 mm. | Between walls JDL & JDM tucked under JDL in House 4, Phase 6 | Chevron |
| Broxmouth | FLC | Broken. One side formed by medullary cavity. Bone charred. Displays high gloss. Length: 36 mm. | Midden material in South West Entrance, Phase 3-4 | Blackened |
| Broxmouth | FRA | Tine of red deer, burned black. Outer end broken and subsequently worn, inner one chopped and broken. Length: 128 mm. | In middens sealing occupation in Phase 5 | Blackened |
| Broxmouth | FXH | Sheep or deer tibia. Articulation removed to facilitate hafting. Butt end has transverse perforation. The point has been blackened by fire and the surface is abraded. | In boulder/ midden deposit in House 1, Phase 6 | Blackened |
| Broxmouth | FXJ | Needle. Broken at both ends. Head has remains of circular perforation. Shank has squarish section. The needle is black and appears to have been burnt. | Over paving in central area in Interior, Phase 6 | Blackened |

| Site | Find Code | Find Description | Context | Decoration |
|---|---|---|---|---|
| Ghegan Rock | HD-78 | Flat semi-circular antler comb with ring and dot, lunar, geometric incised motif decoration. Made of antler either from a very large beast which has been bent to shape, or from scapula. 32 teeth, 12 broken, 7 completely broken off at plate, the others broken towards tooth tip. Teeth are all different lengths between 21mm & 18mm, could be evidence of differential wear. Certainly, the longer of the broken teeth have been subsequently used and are polished with rounded tips. Scratch marks across top of teeth on back of object. There are approx. 20+ parallel notches incised into the teeth on both front and back of all the teeth. Later addition of perforation, oval in shape 4mm x 3mm, through the lunar motif. Decoration consists of 4 ring and dot motifs, 2 on either side, with double concentric ring within which are incised dots. Then 2 conjoined ring and dot motifs in the centre of panel within an oval incision with incised dots. Above these 3 motifs there is a lunar motif within which are incised dots. Probably a compass type tool has been used to decorate this object. The front surface was smoothed prior to decoration and the cancellous bone of antler has been completely smoothed away on back of object. 55 x c.50mm, thickness 3mm. | No context info, Kitchen midden (Laidlay 1870) | Ring and dot, lunar, geometric and possible pigment |
| Ghegan Rock | HD-89 | Bone point (2 pieces) with squared head which is broken (ancient). Blackened by heating, core of bone black. Manufacture stria can be seen. Has been whittled, carved and filed to shape. On one side the cancellous bone is visible (therefore clearly visibly bone, despite colour treatment). Smoothed all over. Length: 56mm. Diam: from 1mm-6mm. | No context info, Kitchen midden (Laidlay 1870) | Blackened bone point |

| Site | Find Code | Find Description | Context | Decoration |
|---|---|---|---|---|
| Ghegan Rock | HD-90 | Bone point. Blackened in medium-high controlled temp. Tip broken off, and has triangular facetted head. Has been whittled and carved to form, creating multi-facets, though from tip of point to c. 21 mm along object circular wear (multiple stria just visible) has worn away the facets, creating an even circumference. Cancellous bone visible on one side of object. 4 small cut marks along one facet near head, <1mm wide. Smoothed all over. At pointed end there is a concentrated area of very small chipmarks, creating a small facet 6 mm x 1 mm. Length: 62 mm. Depth, 5 mm, c.2-3 mm towards pointed end. | No context info, Kitchen midden (Laidlay 1870) | Blackened bone point |
| Traprain Law | GV 770 | Animal bone fragment with incised design. One end has been cut and 3 sides of object broken. Remains of 16 parallel incised lines c.0.5 mm wide, and remains of chevron and cross incised design. Has been burnt/ heated, is chalk white throughout. Diam. c.7 mm. Very similar to GV 926, could be part of same object. | 1920 -L4 (PSAS 1921: 170 & 174, fig. 12, no.17) | Parallel lines, chevron and cross |
| Traprain Law | GV 926 | Decorated animal bone fragment with incised design. One end has been cut by metal blade, 3 sides broken. Remains of 10 parallel incised lines c.0.5 mm wide, and remains of chevron and cross incised design. Has been burnt/ heated to be chalk white throughout. Diam. Approx 7 mm. | No specific context info (1921-M5) | Parallel lines, chevron and cross |

# Appendix 6: Fragmented querns from Broxmouth.

| Find Code | Quern type (RU= rotary upper, RL= rotary lower, S=saddle | Fragmentation | Context |
|---|---|---|---|
| **FUB** | RL | **Corner of grinding face split off.** | From pit (OAC) in southern part of House 1, Phase 6. |
| **EIS** | S | **Corner of grinding face chipped off.** | Tumble behind wall (HCE) in House 7, Phase 6. |
| **FSK** | S | **Spalls detached from face and is broken in half.** | Packing in slot of House 3 (primary bedding trench), Phase 6. |
| **GNO** | S | **Saddle corner of face and 2 sides broken off.** | Incorporated in paving at the West Entrance in annular hollow (ACE), Phase 1. |
| **FUC** | S | **Part of face pecked off and broken in half across grinding surface.** | Re-used in secondary floor of a structure in the Inner Ditch, Phase 4. |
| **EEU** | RU | **Area of face pecked off from near edge.** | From rubble infill of House 5, Phase 6. |
| **DVR and FBI** | RU | **Longitudinal grooves across grinding face of FBI ( not DVR).** | DVR found in rubble sealing post-pipe in House 3. FBI found in adjacent paving/ rubble, Phase 6. |
| **DNA** | RU | **One area of face and circumference broken off, another area of face pecked and worn (could be re-use?).** | Overlying pit in House 7, and at edge of secondary paved floor, Phase 6. |

# Appendix 7: Late prehistoric and Roman pottery found on Iron Age excavated sites in East Lothian.

| Site | No. of LPP sherds | No. of LPP vessels | Samian | Roman Coarse-ware | Other | References |
|---|---|---|---|---|---|---|
| Broxmouth | c.430 | 28 | 5 | 0 | 0 | Armit and McKenzie in prep. 2013 Cool 1982 |
| Traprain Law | c.1000 | 323 + | 34 | ? | 1 Castor Ware | Late Prehistoric pottery is only counted from the 1996-7 excavations onwards. Armit et al 1999, Armit et al 2004, Hunter 2001: 36, Hunter 2006: 61-62, Rees and Hunter 2000: 425, MacSween unpublished MacSween unpublished 2009 |
| Newmains | 241 | 209 | 9 | 10 sherds | 0 | unpublished |
| Phantassie | 349 | 192 | 1 | 0 | 0 | Lelong 2007 |
| Knowes | 84 | 46 | 1 | 5 Roman flagon fragments (from same vessel) | 0 | MacSween 2009:118-121 and fig. 7.5 p.122 Willis 2009: 123 |
| Thistly Cross | 10 | ? | 0 | 0 | 0 | Innes 2008: 131 |
| Fishers Road East | 8 | ? | 0 | 0 | 0 | Gwilt 2000: 133 |
| Fishers Road West | 12 | ? | 0 | 1 | 0 | Thomas 2000: 33 |

| Site | No. of LPP sherds | No. of LPP vessels | Samian | Roman Coarse-ware | Other | References |
|---|---|---|---|---|---|---|
| St Germains | c.379 | 200 | 6 | 1? | 0 | Alexander and Watkins 1998: 224-233 |
| Eweford | 39 | 14 | 0 | 0 | 0 | MacSween 2008 |
| Foster Law | 16 | ? | 0 | 0 | 0 | MacSween 2009: 120-121 |

# Appendix 8: Fe and CuA metal working evidence in East Lothian.

Metal finds and metallurgical evidence from Late Bronze Age to Iron Age archaeological contexts are given in this table. Objects from topsoil, ploughsoil, or unstratified contexts are not included. Where possible associated dates for the metal objects and evidence for their working are given, with additional details when necessary. Caution in looking for chronological patterns must be exercised, since metal objects are most often found in secondary deposits away from locations of their manufacture or use, frequently in midden which may have been curated. In these instances metal finds may actually be significantly earlier than their associated dates. Also, at Knowes the metal objects may be significantly earlier than their *Terminus Ante Quem*s. Rows in grey are sites which have not been excavated.

| Site | Fe Metal Objects | CuA Metal Objects | Composite CuA and Fe | Other Metallurgical Evidence | Associated Dates from excavation (as accurate as possible) | References |
|---|---|---|---|---|---|---|
| Broxmouth | 3 plates, ring, bar, 6 rods, 5 points, 3 nails, 4 strips, disc, hook, irregular frags | 2 bracelet frags, 2 pins, ring, 3 strips, hook, spiral finger ring, binding, 3 needles, horse trapping, bolt, chain link, penannular brooch fragment, hollow tube/ fitting | None | Fragments of furnace wall, tap slag, slag, tuyère fragment (?), baked clay, vitrified ceramic, copper casting debris, cinder, bloom, ironstone | Phases 1, 2, 3/4, 5 and 6 | Armit and McKenzie in prep. 2013 |
| Rhodes Links at base of North Berwick Law | None | Ring-headed pin | None | None | SITE NOT DATED | Richardson 1907: 428-430 |

| Site | Fe Metal Objects | CuA Metal Objects | Composite CuA and Fe | Other Metallurgical Evidence | Associated Dates from excavation (as accurate as possible) | References |
|---|---|---|---|---|---|---|
| Dryburn Bridge | Ring, knife (?), ferrule (?), square-sectioned rod, sickle | Twisted hoop, mounts, rod, circular section rod, 27 sheet fragments | None | None | 800 cal BC to 400 cal BC | Dunwell 2007: 96, Hunter 2007:78- 79 |
| Eweford Cottages | None | None | None | Micromorphological mineral residues in midden deposits at temperatures above 800°C | 350 cal BC to 40 cal BC | Innes 2008: 140 |
| Fishers Road West | Bar, nail, ring | None | None | Smithing and forging slag, hearth bottom and lining and associated material, ore (possibly pyrite) | 700 cal BC to cal AD 200 | Heald 2000: 38-39, McCullagh and Mills 2000: 26 |
| Fishers Road East | None | Decorated low-zinc brass strip possibly part of buckle (?) and a high tin leaded bronze broken D-shaped section. | None | Crucibles, a tuyère, Fe slag, fired clay, hearth fragments, fuel ash, coal and charcoal from same context as metalworking evidence. | In deposits dating to main period of site occupation from 1st century BC to 2nd century AD.<br>The CuA buckle and D-shaped section come from late unphased contexts. | Adams and Philip 2000: 126- 132, Lowther 2000: 138-140, Lowther 2000: 145 |

| Site | Fe Metal Objects | CuA Metal Objects | Composite CuA and Fe | Other Metallurgical Evidence | Associated Dates from excavation (as accurate as possible) | References |
|---|---|---|---|---|---|---|
| Knowes | Nail | Frags of wire, loop or coil, spiral finger ring, ring, rivet and tack conjoining to sheet metalwork and more sheet metalwork (found in two separate packages) | None | None | A date range of **1-220 cal AD** from the hearth of structure CS2 provides as *TAQ* for the deposition of the CuA sheet, spiral finger ring, rivet and Fe nail. **90 cal BC- cal AD 90** provides a *TAQ* for the deposition of frags of CuA sheet on surface of Western ditch. The scoop in which the CuA wire, loop and coil fragments were found is dated to **210-1 cal BC**. | Hunter et al 2009: 139-140, Hamilton and Haselgrove 2009: 198-199 |
| Newmains | 2 nails | Sheet metalwork, binding, peg, buckle, ring from penannular brooch, beaded torc | None | Fe slag | SITE NOT DATED | Unpublished |
| North Berwick Law | None | 2 axe-heads, key (Roman), sword | None | Smithing evidence (character not known) | SITE NOT DATED | Hunter 2009: 147, unpublished |

| Site | Fe Metal Objects | CuA Metal Objects | Composite CuA and Fe | Other Metallurgical Evidence | Associated Dates from excavation (as accurate as possible) | References |
|---|---|---|---|---|---|---|
| Phantassie | Draw bar, knife, ard, frag of bar | Penannular brooch, frag of brooch and 2 undetermined fragments | Linch pin | None | Iron draw bar pushed into accumulating midden with date range **100 cal BC- AD cal 80.** **40 cal BC- cal AD 130** provides a *TPQ* for the deposition of the linch pin. The other metal finds were in contexts covering the history of site occupation from **c. 200 BC to AD c.300,** the frags of CuA and Fe bar found in Phase 5 **cal AD 100/200**. | Lelong 2008: 147-198 |
| Whittinghame | None | Enamelled stud with square sectioned tang | None | None | c. 330 cal AD to cal AD 550 | Hunter et al 2009: 139, Haselgrove et al 2009: 35-36, Hamilton and Haselgrove 2009: 190 |
| Traprain Law | Brooches, rings, sickle, swords, knives, skeuomorphic antler object, bars, and other unidentified frags | Rings, brooch fragments, armlets, keys, locks, ring-headed pins, gouges, swords, axes, wire frags, horse gear, toilet articles and miscellaneous fragments | None | Hearths from LBA contexts and clay and sandstone moulds in lower and upper layers, moulds, possible crucible fragments from LBA layers and later upper layers. | c.1000 to 800 BC, and AD c. 300/400 | Burley 1955-56, Jobey 1976, Armit et al 2006: 602-607 |

| Site | Fe Metal Objects | CuA Metal Objects | Composite CuA and Fe | Other Metallurgical Evidence | Associated Dates from excavation (as accurate as possible) | References |
|---|---|---|---|---|---|---|
| St Germains | None | Rings, Romano-British trumpet brooch, dumb-bell toggle, bead/ washer/ ring, terminal of penannular brooch, tweezers, rod and fragments | None | Mould fragment, crucible/ tuyère, ferritic slag? | SITE NOT DATED. All objects from unphased/ unstratified contexts, ferritic slag from unphased colluvial deposits. Other site and object parallels date this metalworking evidence to the Iron Age and Late Iron Age. Copper alloy spiral finger ring from Phase 3 stone paved structure/ Iron Age roundhouse. | Alexander and Watkins 1998 |

# Appendix 9: Artefacts deposited in the pits outside of abandoned House 6, Phase 6, at Broxmouth.

| Pit Context Code | Layer Number (top-bottom) | Finds Code | Finds Description | General Find Type |
|---|---|---|---|---|
| JCR | 3 | EMI | Long handled comb, antler. Rough exterior surface of antler has been removed and the exposed surface is abraded. It has a pronounced curve in cross section and a perforated fishtail end. Two roughly parallel lines enclose the perforation. There are two incised lines at the base of the dention. The nine teeth are closely set, of irregular thickness and length (average 35 mm). The tips of the teeth form an unbroken line across the breadth of the comb unlike the interdental notches which are staggered. the tips of the teeth are polished. Length: 118 mm. Breadth at dental end: 37 mm. | Long-handled antler comb |
| JCR | 3 | EYL | Broken wellfinished point. Shank has squared and tapers to a fine point. Length: 60 mm. | Bone point |
| JCR | 4 | EZJ | One body sherd and thirteen fragments. Tempered with white, dark and black and white crystalline grits (up to 3 mm in length). Fabric fired dark grey in core and on interior, orange on exterior surface. Wall thickness: 21 mm. | Type 2 pottery cache (14 sherds) |
| JCH | 4 | CFA | Nail shank? rectangularsectioned rod tapering to point at one end, broken at other. Length: 78 mm., section: 4.5 x 4 mm. | Iron nail shank? |
| JCH | 4 | FFH | Rod ovalsectioned; one end flat, other broken. Length: 45 mm. Section: 3.5 x 3 mm. | Copper alloy rod |
| JCH | 2 | EIU | Needle description as no. 518 above; ovalsectioned shank broken across perforation. Length: 48 mm., Section: 1.25 x 1 mm. | Copper alloy needle |

| Pit Context Code | Layer Number (top-bottom) | Finds Code | Finds Description | General Find Type |
|---|---|---|---|---|
| JCH | 1 | EZG | One body sherd with only one surface intact. Tempered with light and dark angular grits (up to 6 mm in length). Fabric fired dark grey in core, orange on surface. Wall thickness: 13 mm. | Type 2 pottery sherd |
| JCW | 1 | EMS | Small Bone point, broken at base. Slightly curved with facetted section. Displays general polish. Length: 24 mm. | Bone point |
| JCW | 1 | EMS (2) | Crudely made, end chopped at oblique angle, head tapers to point. Has square section, shanks are slightly polished. Length: 33 mm. | Bone point |
| JCW | 1 | FAW | Quartz carboniferous sandstone, coarse grained, rotary quern fragment. | Rotary quern |
| JCW | 1 | CFS | Long Horse trapping cast D-sectioned trapping with flat back. pointed oval petal ring (with rounded baluster at points at either end) connected to central unit by concavesided bar with swelling at either end. Central unit consists of four similar petal rings joined together in centre. Petal ring at either end has rectangular loop behind it. The whole cast in one piece. Length: 89mm., Section (concave bar): 5.5 x 3 mm. | Copper alloy horse trapping |
| JCW | 2 | ERW | Pin/needle shank circularsectioned, tapering to flattened point, other end broken. Length: 47 mm., section:1.5 mm. | Copper alloy needle |
| JCW | 2 | EZW | Strip rectangular sectioned, broken at both ends; one end bent at approx. 130 and widens before break. Length: 99 mm. Strip section: 9 x 3.5 mm., foot section(approx): 10 x 6.5 mm. | Iron strip |
| JCW | unassigned layer | CFS | Needle circular-sectioned shank tapering to point; flattened, pointed head with elongate, oval perforation made by incised grooves worked from both sides. Length: 79 mm., Section: 2 mm. | Copper alloy needle |

| Pit Context Code | Layer Number (top-bottom) | Finds Code | Finds Description | General Find Type |
|---|---|---|---|---|
| JCG | 1 | JCG | One body and eight small fragments. Tempered with white grits (up to 1 mm in length) and occasional larger dark crystalline grits. Fabric fired dark grey in core and buff/orange on surfaces. Wall thickness:17 mm. | Type 2 pottery cache (9 sherds) |
| JCG | 1 | EIY | Antler. Has transverse, subrectangular perforation (26 x 12 mm) which is well worn and polished. One end has an angular, longitudinal socket in the cancellous bone which intersects the transverse perforation. The other end has a much smaller regular cavity. The rough surface of antler is worn and in places missing, displays a general polish. Both ends are worn and polished. It is likely that the longitudinal and transverse perforations represent separate uses of the antler. The wear patterns suggest the transverse perforation was later. It is possible that this object was originally a socketed handle. Length: 83 mm. | Worked antler fragment |
| JCG | 4 | GAP | Flat splinter of bone, with fine, well polished point. one side formed by medullary cavity. | Bone point |
| JCG | 4 | EIT | Fragment of rotary quernstone (EIT). Gently convex grinding face with no clear indication of dressing. Maximum wear about skirt and eye, concentric striae also spread across breast. Portion of biconical eye survives at centre of stone. Sides of stone are dressed to shape neatly, except irrugular surface opposite grinding face, which is scarred with limpet hollows and represents cortex of sourceboulder. Sides of stone are chipped (Ill. ?). Thickness: 9.6 5.4 cm. Diameter: 36.0 cm. Biconical eye: diameter: 9.1 cm; (min): 2.5 cm; (base): 5.1 cm. Petrological Identification: Coarse-Grained, micaceous, carboniferous sandstone. | Decorated upper rotary quern (with enhanced limpet scarring) |

# Appendix 10: Publications and archive reports related to the thesis.

**Maxwell, M., Evans, A., and Edwards, H. G. M. (2012). "MatterReality: The Use of Scientific Method for Interpreting the Materialities of an Iron Age Antler Drum."** ***Archaeological Review from Cambridge*****, 27(1), 26-46.**

## MatterReality: The Use of Scientific Method for Interpreting the Materialities of an Iron Age Antler Drum

Mhairi Maxwell Adrian Evans & Howell Edwards

*Division of Archaeological, Geographical and Environmental Sciences*
*University of Bradford*
*mlmaxwel@brad.ac.uk*
*a.a.evans@brad.ac.uk*
*h.g.m.edwards@brad.ac.uk*

### Introduction

There has been a call for a return to materials in material culture studies (Hurcombe 2007; Ingold 2007), to a focus on properties that reside in nature. However, tangible experiences with materials are performative during episodes of manufacture, use and reuse, and thus can only be understood according to their use and value in social engagement (Gell 1998), the traces of which can be found upon and permeating object surfaces. In this study of the biography of a decorated antler drum from Broxmouth hillfort with enigmatic ring and dot motif, analytical LSCM and near infrared Raman spectroscopic methods were used in order to contextualise the material and decorative properties of this object within qualitative spheres of social engagement.

Methodologically this paper aims to employ scientific method and material culture studies in the biographical interpretation of an Iron Age artefact from Broxmouth hillfort, East Lothian. The objectives of this paper are twofold; firstly, to demonstrate how the non-invasive and non-destructive methods of laser scanning confocal microscopy (LSCM) and near infrared Raman spectroscopy can specifically aid archaeological studies of object biographies by uncovering the tools employed by the craftsperson(s) and reconstructing episodes of engagement. Secondly, the paper will demonstrate the benefits of both of these archaeometric techniques for answering specific archaeological questions, hopefully stimulating further research into these methods for archaeological material culture studies.

## Material and Methods

The object under study is part of an extensive Iron Age bone and antler assemblage (n=325 objects) for southern Scotland from Broxmouth hillfort, East Lothian, which was occupied 705 cal BC–cal AD 260 (Armit and McKenzie in prep.). The object was found associated with structures dating to 320–240 cal BC. The total size of Broxmouth's assemblage rivals that of Danebury, Hampshire (numbering 338 artefacts of bone and antler, excluding manufacturing waste) (Cunliffe and Poole 1991: 354–68).

The artefact studied (find code GDC) was a perforated drum (length 22mm) made of antler, with eight regular ornamental double concentric rings. The inner ring has diameter 5mm and the outer ring 10mm diameter from the central dots (fig. 1). It was originally part of a composite object, probably a handle. This offcut is very well preserved, but has a crack which extends through the length and depth of the object across one of the ring and dot motifs and which therefore occurred sometime after decoration. The presence of a black pigment-like substance in one of the outer ring incisions (GDC ring number one; figs. 1 and 2) was noted during concordance work conducted for the Broxmouth Project in the National Museum of Scotland in January 2009. The object was then loaned to the University of Bradford to examine this further as part of Maxwell's doctoral research on the materiality of the southern Scottish Iron Age.

Before in depth work was carried out using the analytical methods introduced below, this object was studied using a LEICA MZ16 microscope at magnification 100–150x. The suspected black pigment could be seen to underlie an uneven orange/brown substance, but it could not be confirmed whether either of these substances were residual or deliberately applied using this method alone. Additionally, examination under the microscope showed the high quality crafting involved in the decoration of this object; evident in the regularity and neat incisions that make up the ring and dot motifs. Moments when the tool accidentally slipped or was misplaced are clear on rings GDC 1 and GDC 2 (fig. 1), suggesting use of either a trepanning type tool or compass for decoration. The exact tools used were further studied using LSCM and near infrared Raman.

Fig. 1. Photographs and drawing of antler drum (finds code GDC) from Broxmouth hillfort, East Lothian, scale 5cm. The outer ring of a ring and dot motif has been outlined in black, to imitate the application of black pigment which was detected using LSCM and near infrared Raman. The photograph to the right shows how this drum was sawn off from an originally larger composite object, the perforation is subsequently worn. The scaled drawing below shows a panorama of the placement and incision marks of the the ring and dot motifs (far left GDC ring number one, to ring number eight on far right). Slippage of the compass tool and inconsistencies in the design are evident. (photographs and drawings: M. Maxwell)

The laser scanning confocal microscope used was an Olympus LEXT OLS 3100 on loan from Olympus Microscopy. Using a high magnification range of 120–14,400x lasers calculate the surface tomography between known highest and lowest points on the object surface to a horizontal resolution of 0.12µm, combined with microscope optical sections taken at defined intervals. This creates a three-dimensional surface map image of the object surface that can be manipulated and from which detailed measurements can be taken. Therefore this method is non-destructive and non-invasive. Laser scanning confocal microscopy has been suggested as a potential technique for studying lithic microwear, praised for its high quality images (better than a Scanning Electron Microscope), ease of manipulation, ability to study objects of all sizes and as a quick method (Evans and Donahue 2008: 2229). An obvious benefit of laser scanning confocal microscopy for our study is that it can introspectively examine artefacts of awkward shape, without causing any damage by creating easy to manipulate high resolution three-dimensional images of the surface.

The Raman spectrometer used was a Renishaw inVia. Raman spectrometer with a near infra-red laser source operating at 785 nm and a charge coupled device (CCD) detector. Wavenumber shifted Raman bands from the incident laser frequency are characteristic of the chemical species and functionality in the specimen under study and can be used to identify organic and inorganic materials in admixture without effecting their separation, which is particularly relevant for archaeological artefacts. The observed spectral signatures can be compared with known substance reference materials and literature databases; in this case the Raman spectroscopic library of natural and synthetic pigments (pre≈ AD 1850) (Bell et al. 1997) was referred to. Raman spectroscopic analysis is a method now frequently used to study the chemical composition of substances on surfaces (Edwards and Chalmers 2005) and is being increasingly used in archaeometrical studies to characterise ancient materials including glass and faience, biomaterials, ceramics and glazes, lithics, metal patinas and inclusions, textiles, pigments and treatments in art-historical objects, plant fibres and organic residues such as resins (Smith and Clark 2004 provide an overview of Raman studies applied to archaeometry).

Work on antler and bone, and other organic materials, is at an early stage and is therefore little understood; analysis using lasers can potentially be damaging to these softer materials (Smith and Clark 2004). However, long wavelength Raman spectroscopy has been successfully employed to study mummified skin and nails (Edwards et al. 2002) and bone and ivory (Edwards and Farwell 1995). Raman spectroscopy is also now employed in art conservation to detect the pigments used, including organic based pigments, in paintings at low laser powers (Vandenabeele et al. 2001). In our case it was deemed safe by careful use of minimally low laser powers for studying the pigment on the ancient antler object from Broxmouth hillfort based on a prior test carried out by the authors on a modern antler standard, whereby the experimental conditions used were deemed satisfactory for examination of the archaeological artefact.

The presence of pigments or inlay on Iron Age objects of bone and antler has been noted previously, and at the sites of Foshigarry and Bac Mhic Connain, Western Isles, seven objects including two handles incised with ring and dot in with suspected pigment, were studied using X-Ray Fluorescence (Hallén 1994: 228) but this gave inconclusive results. The substances in this case were therefore interpreted as unknown organics. Raman spectroscopic analysis is ideal for studying both organic and inorganic compounds in a range of physical states including solid, liquid, solution, and gaseous states since it works at the molecular level of compound structures. This is unlike XRF which is less sensitive to organics and is best suited to solids and analysis of full-sized objects (Pollard et al. 2007: 118) and not suitable for the targeted analysis of surface residues.

Therefore, this method is a good investigative technique of organic materials, including archaeological residues, and is non-destructive and non-invasive if used correctly. The cost and space requirements for this equipment are potential obstacles. Importantly, for both LSCM and Raman methods no samples need to be prepared or taken from the object.

## Previous Work: Colour And The Manufacture Of Ring And Dot

Red, blue, green and yellow glass inlays are well known from the Iron Age, dating from the second century BC through to the Roman period. The types of objects that this coloured embellishment is found on include so-called Celtic art, weapons, helmets, horse gear, shields, cauldrons and embossments of metal (iron and copper alloy), sometimes with bone or antler handles or attachments. A full up to date database of these objects is provided as part of the project Technologies of Enchantment: Early Celtic Art in Britain (British Museum 2010; Garrow et al. 2008: 15–39). The only objects with red inlay which pre-date 100 cal BC listed in this comprehensive database are three nearly complete swords from cart burials at Wetwang Slack, and a burial at Kirkburn (Stead 2006: 172), all from East Yorkshire (the Kirkburn sword has been radiocarbon dated to 360–110 cal BC). Roman brooches, bangles, vessels, horse gear and belt plates of metal (mainly copper alloys) were inlayed with red, yellow, blue, green, orange, black and white glasses.

The chemical composition of vitreous inlays from the later Iron Age and early Roman period, first century BC to the later second century AD, have been scientifically examined by Hughes (1972: 98–105), Bateson and Hedges (1975: 177–190), Spratling (1980: 113–18) and Henderson (1990: 285–94). Hughes (1972) and Spratling (1980) show that different production batches of red vitreous pastes can be detected, some of which were imported from the Mediterranean. Coral studs, also from the Mediterranean, were used as colourful embellishments on similar types of objects, for example on five terrets from burials at the Iron Age site Wetwang Slack dated to 350–150 BC (British Museum 2010). No other materials, including organic substances, are referred to in the literature as used to colour objects in the Iron Age. This is despite the fact that many site material culture catalogues note staining and residues on worked stone pounders, grinders and mortars from at least the middle Iron Age (c.400 BC); for example ferruginous deposits are noted on cobbles from the middle to late Iron Age site of Knowes (Lowther and Hunter 2009: 136) and a yellow/green substance sitting in the bowl of a mortar found in a middle to late Iron Age context from Broxmouth (McLaren in prep.) and bright blue staining on sandstone discs from Traprain Law (Proceedings of the Society of Antiquaries of Scotland 1923) late Iron Age in date (Armit et al. 2006: 605–606). Possible pigment was noted in incised worked bone or antler objects from two Iron Age sites in the Western Isles—Bac Mhic Connain and Foshigarry, North Uist—and analysed using XRF but gave negative results (Hallén 1994: 228). More work to establish the nature of these substances is therefore needed to understand the context of pigment use through time.

Ring and dot motifs are commonly found on a range of artefacts of bone and antler including combs, pins, toggles and handles throughout the Early to Late British Iron Age, Viking period and until the early Medieval period. In the Viking and early Medieval period, these motifs were thought to be created using an as yet undefined specialist tool (MacGregor 1985: 6). Iron Age objects with ring and dot motifs are executed variably in a range of decorative schemes, usually associated with parallel line designs and it has been noted that the skill in execution of these motifs ranges widely (Tuohy 1995: 77, 143).This meant that they were not necessarily decorated by one specialized craftsperson. Compass tools' lack of precision and variability is the reason given by scholars for why this tool would have been an unlikely choice to create motifs which look concentric and precise to the eye (MacGregor 1985: 75; Tuohy 1995: 57). Penney (1975: 65–66) cites the example of a comb from Meare West, Somerset, which has ring and dot with associated linear decoration incised with a rolled graver, a specialist tool more commonly used in metalworking. Another sheet bronze dagger sheath with rocked graver decoration is known from Cadbury Castle, Somerset (Spratling 1972). Additionally, Tuohy (2000: 144) states that we must be cautious in making gender associations even "if one notes that most of the tools used for the basic manufacture can be used in carpentry and are usually connected with men… pointing to a male antler worker or comb maker,". Instead a lengthy process involving the harvesting of antler, trimming, soaking, boiling, splitting and cutting of the bone before carving and shaping the object and then decoration, requiring the assured use of non-specialised and non-gendered tools is assumed (Maxwell 2012).

Tuohy (2000: 144, 151) argues that all of the above stages in antler working could have involved either gender and more likely involved the whole household. Manufacture evidently involved more than one individual; she cites examples showing secondary decoration, including the incompatibility between a well made comb and its haphazard decoration from Maiden Castle (2000: 139) (see figs 9.2a and 9.2b). Therefore these motifs were not necessarily symbols of one craftperson's skill (like a maker's stamp), but were perhaps incised during transitional moments in an object's biography.

## Results: The Materiality Of Science

### LSCM Microscopy

LSCM microscopy revealed a uniform layer of glossy black substance underlying an uneven layer of orange/brown substance (fig. 2) in the same area of the outer ring incision where pigment was detected by eye in the museum and the preliminary 100–150x magnification microscope work (fig. 2). A longitudinal scratch mark (approx. 0.16mm wide and 5.76mm long) was seen to cut through both the orange/brown substance

| Outer Ring Number | Ring depth range (ųm) | Ring width (ųm) | Ring depth range (ųm) | Ring width (ųm) |
|---|---|---|---|---|
| GDC 1 | 450 | 750 | 424 | 720 |
| GDC 2 | 306 | 715 | 310 | 720 |
| GDC 3 | 326 | 730 | 405 | 732 |
| GDC 4 | 377 | 752 | 405 | 735 |
| GDC 5 | 102 | 315 | 337 | 545 |
| GDC 6 | 363 | 595 | 338 | 582 |
| GDC 7 | 490 | 765 | 343 | 806 |
| GDC 8 | 434 | 808 | 402 | 785 |

Table 1: LSCM depth and width measurements from two sections of the outer ring of each motif (ųm). This level of accuracy allows examination of the varied tool profiles for each motif, and differences between motifs have become apparent. In particular GDC 5 is very shallow and narrow, and GDC 7 is very deep and wide in the areas where measurements were taken.

and the black substance in the ring incision through and into the surface of the antler (fig. 2). On closer magnification the regular parallel nature of the stria of this scratch show this to be a modern tool such as a wire brush used for cleaning. The stratigraphy of these surface layers show the black to be a deliberately applied archaeological substance.

The measurements of the central dots vary widely, particularly in depth, ranging between 1430ɥm (max) to 304ɥm (min) deep and 783ɥm (max) to 599ɥm (min) diameter. Measurements in the table above (table 1) were taken from sections at two different points for each outer ring. The width and depth of the outer rings are fairly consistent, except rings GDC 5 and GDC 7, and the width and depth comparatively between the rings are within a range of 129ɥm and 139ɥm (this is the average in each case of both measurements taken from each ring, except GDC 5 and GDC 7, both of which are outliers). These observations support the hypothesis that the tool used was a hand-held compass with centre bit, accounting for variations in applied pressure, rather than use of a cylinder boring tool (like a modern-day woodcutting tool) or a static double pronged trepanning tool or bar. A cylinder or double pronged tool would be expected to give uniform or relative depth and width readings from any point in the ring

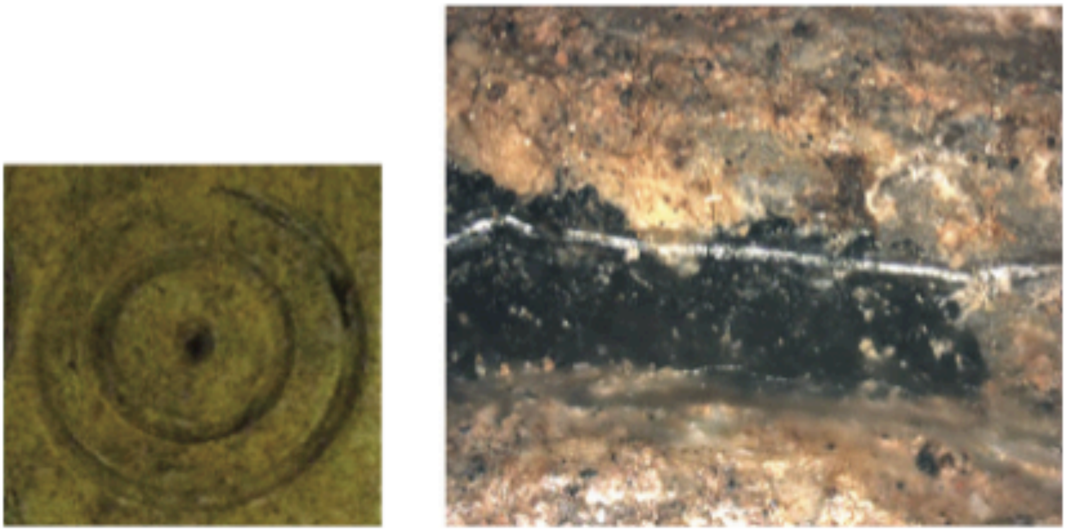


Fig. 2. Left Photograph of GDC ring number one showing where the pigment can be seen by eye in the outer ring and dot. Right Micrograph of the suspected black pigment which is seen to underlie an uneven orange/brown substance. A scratch, probably from a modern metal brush or point (due to the parallel nature of the stria) used to clean this object after excavation, cuts through both layers. This showed that the black substance was archaeological. (Photograph: M. Maxwell, LSCM Microscopy: Dr A. Evans and M. Maxwell)

diameter to the central dot, rather than the minor but sporadic variation which is evidenced here. This strongly suggests the use of a compass tool with extendable leg. When using a trepanning tool or compass slippage is possible (see fig. 1) while depth will alter according to the level of direct pressure applied and will adapt according to natural inconsistencies in the antler. An attempt to force the point through a tough bit of antler is clear in Figure 3 and could account for the shallow depth measured in outer ring GDC 5 (102µm).

A compass was an ideal tool for creation of the ring and dot motif, or alternatively the invention of the compass lead to the creation of the motif; a central dot is unavoidable when using this tool. The use of an adjustable compass requires more skill, stability and accuracy with the potential for adaptability in design rather than a standardised cylindrical boring tool or static double pronged trepanning tool.

An interesting discovery is the range of tool profiles. Figure 4 shows the markedly different bevelled, rounded and flat tool profiles observed using LSCM. This either shows the sharpening/blunting of a bevel point during working, or the use of different points in the decoration of the antler drum. It indicates that the compass could have been an adaptable tool where the points could be sharpened or even changed, potentially to suit different materials and purposes like a modern power drill with a variety of interchangeable bits. Craftspeople with adaptable compasses in their toolkits were probably

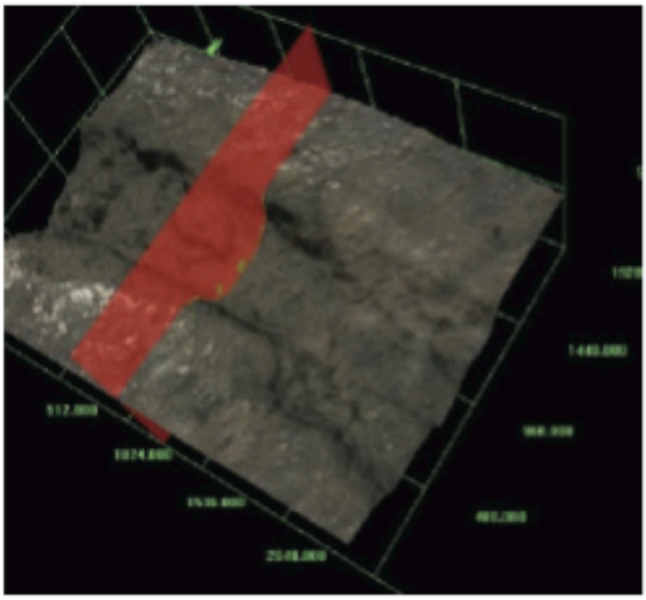


Fig. 3. Section view of the outer ring of GDC number two, showing tool profile and overlapping incisions into antler surface, where the maker has forced the tool through a tough bit of antler. (LSCM Microscopy: Dr A. Evans and M. Maxwell)

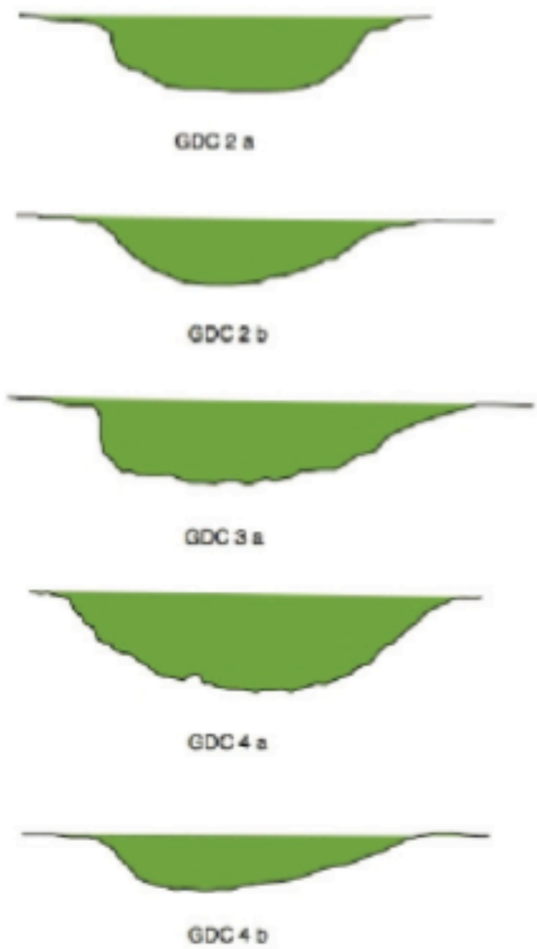
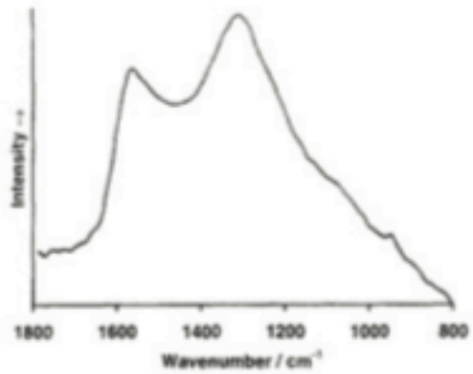



Fig. 4. Digitised LSCM sections, relative in scale, of the outer rings of the ring and dot motifs. Two sections from GDC outer ring number two, one section from outer ring number three, and two sections from outer ring number four show varied profiles. The varied tool profiles could be caused by the use of different compass points, the blunting of compass points (although GDC number two is markedly different) or the application of different pressure. This shows the use of an adaptable compass. (drawings from LSCM: M. Maxwell)

working with more than one type of material and therefore must have had a range of material knowledge and varied skill-sets.

The use of different tool profiles in the decoration of this one drum could mean that it was decorated at different times in its biography and possibly by different craftspeople.. The depth of outer ring GDC 2 is markedly less pronounced and at one point the two concentric rings do not join; perhaps this motif was unfinished. Additionally, the outer ring GDC 5 has a particularly shallow depth and small ring diameter in both measurements taken, and GDC 7 is deeper and wider in some areas (table 1). These observations suggest that for the decoration of these motifs the point was sharpened, changed, or even it could be that it was incised by a different craftsperson who applied different pressure. There may even be a time lapse between the additions of the motifs. Clearly the decorative scheme was planned for this object, so that eight concentric rings would fit around the circumference of the object, but it may be that it took years, months, weeks, days, not hours, to complete.



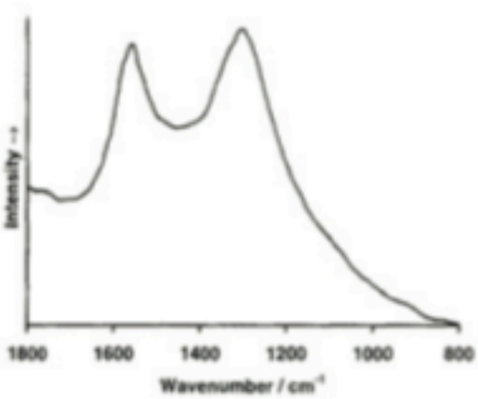
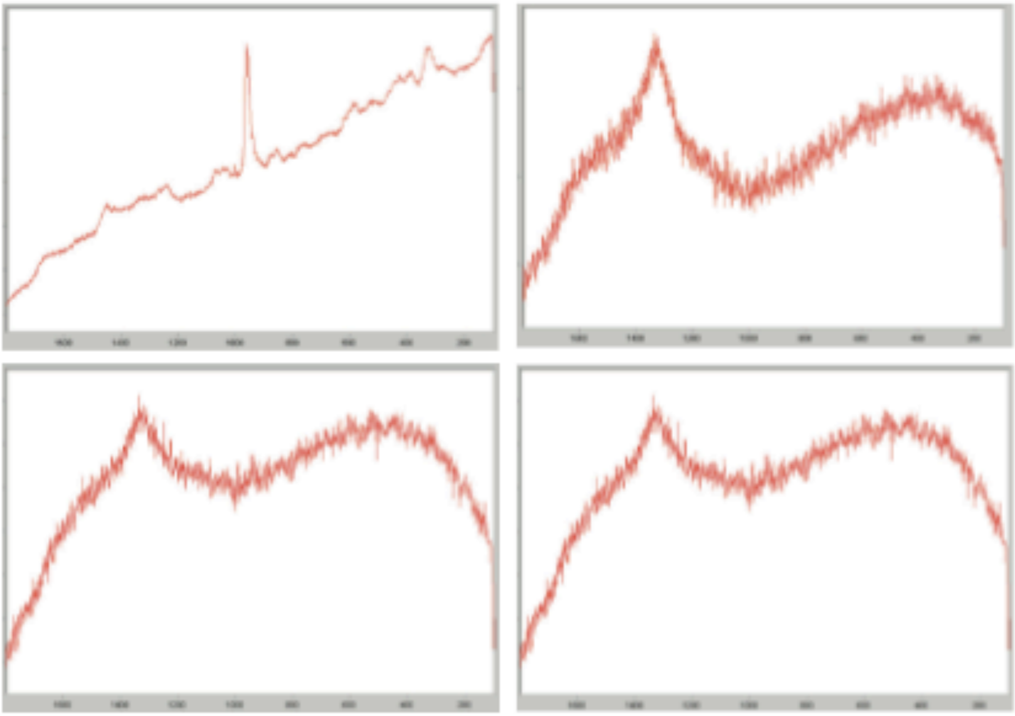




Fig. 5. The index of pigments from Bell et al. (1997). Top: Ivory black. 638.2 nm excitation, 6mw. Bottom Bottom: Lamp black. 638.2 nm excitation, 6mw. (Bell et al. 1997: 2160, fig.1 and fig.2).

## Near Infrared Raman Spectroscopy

First, a spectrum from an antler standard was taken, shown in Figure 6 (top) using a 50x microscope objective, a scan time of 10 seconds, a laser excitation wavelength of 785nm and laser power of 100mW over a wavenumberrangeof100–1800cm-1. The survey spectrum did not show any spectral features above 1800cm-1. The peak at 958cm-1 is assigned as calcium phosphate, the inorganic component naturally occurring in the antler matrix. The background emission is expected for archaeological artefacts and arises from absorbed fluorescence from the depositional environment over some 2000 years (Edwards and Farwell 1995; Price et al. 1992: 514).

In total six readings on the antler drum were taken. A lower laser power on the antler surface and on the suspected black pigment were used so as not to damage the object. There are two peaks from spectra with wavenumber maxima at 1340cm-1 and at 1585cm-1 (middle and bottom spectra, fig. 6). The observed Raman bands occur at the same wavenumber and are comparable in relative intensity to the spectral responses from ivory black and lamp black pigments (Bell et al. 1997) (fig. 5). Both of these are amorphous carbon pigments and the D and G band signatures arising from sp3 and sp2 hybridised carbon are broad and diffuse as normally experienced from a vegetable based charcoal carbon pigment.



X-axis: Wavenumber $cm^{-1}$.
Y-axis: Intensity.
Fig. 6. Raman spectra of antler standard (785 nm excitation, 100 mW). The peak at 958$cm^{-1}$ is assigned as calcium phosphate, the inorganic component naturally occurring in the antler matrix.
Raman spectra (785nm excitation, 1mW) from the pigment identified in GDC outer ring number one (see fig.2). Wavenumber maximas at 1340$cm^{-1}$ and 1585$cm^{-1}$.
Raman spectra (785nm excitation, 1mW) from a second point along the pigment identified in GDC outer ring number one (see fig.2). The same result: wavenumber maximas at 1340$cm^{-1}$ and 1585$cm^{-1}$.
The results from the last three spectra can be compared to black carbon based pigments in Bell et al. (1997) (see fig.5).(Raman spectroscopy: Prof. H. Edwards, D. Farwell and M. Maxwell)

## Discussion: Performed Materialities

Organic compounds were of course readily available for creating pigments in prehistory and the Raman analysis presented here clearly illustrates the use of a carbon pigment, probably vegetable charcoal based, on an Iron Age object found at Broxmouth hillfort, East Lothian. Charcoal was probably used as the pigment on this object with a binder of animal fat, beeswax, milk, egg whites or even semen as Carr has demonstrated for use with woad (Carr 2005: 276). Charcoal was also required and specially produced seasonally for metal-working and an association between metal and bone is perhaps further visibly expressed by use of charcoal pigment for decoration. However, it is worth noting that equally for the small amount of pigment required for this antler drum, charcoal could have been taken from the domestic fireplace. However, as argued below, the compass is a tool associated with Iron Age metal-working, suggesting the involvement of this antler drum in restricted skilled networks of craftworking. .

The findings that compass tools and pigments were used in the decoration of this middle Iron Age organic artefact are significant, but are difficult to contextualise currently due to a lack of comparative archaeological evidence. The only known compass object dating to the Iron Age in Britain is from Fairy Knowe, Stirlingshire (Hunter 1998: 366). The use of compass tools for decoration is commonly seen as a technique restricted to La Tène style Celtic art, adopted in Britain in the fourth century BC and found on mostly objects of metal (Megaw and Megaw 2005) or on bone and antler combs. This art was not merely decorative but was "shape-changing and ambiguous" (Megaw and Megaw 2005: 11) and enchanted objects with transformative, ensnaring captivity (Giles 2008: 66). Embellishing objects with colour are often thought to be restricted to mainly metal objects of so-called Celtic Art or of Roman origin or influence, using glass or vitreous materials or coral. We have shown the use of a readily available organic pigment on an organic antler drum with ubiquitous Iron Age ring and dot decoration.

Similarly, the ring and dot could be seen as more than just a decorative motif, but rather its incision over time and pigmentation recognised as a performative act empowering the object, the makers and users. This object is actually an offcut from an originally larger handle. There is evidence for secondary use of this object; the subsequent polishing of the surfaces including the detached sawn end, and the worn perforation are testament to this. This object was likely suspended, and if spun it would have had a particularly hypnotic, entrancing affect, engaging the viewer. The contrasting black pigment will have enhanced these qualities.

The use of a compass tool required good lighting and stability and so, as Tuohy (2000: 144) suggested, these objects were not decorated within a domestic house context. The use of a compass tool may infer a link with metalworking, in agreement with the object cited by Penney (1975: 65-66) and as highlighted above in reference to La Tène art styles. Metalworking is often interpreted as a powerful performance, embodying regenerative and destructive power (Hingley 1997; Giles 2007: 395). The transformation of ore to iron provides a metaphoric means of understanding social transformation, where the ability to control such a powerful regenerative and simultaneously destructive creative process required participation in a network of social relations and access to skilled know-how (Giles 2007). The same could be argued for the investment embodied in this object and the possibility that it was worked by people who also worked with metal or in a shared space in which these activities took place.

Additionally, the choice of antler as a material to be worked and reworked is perhaps significant. Maxwell's doctoral research has shown that the worked antler from East Lothian, with burrs still attached, were cast. Since antler is cast in Spring and is prone to rapid decay due to its spongy cancellous core (MacGregor 1985: 12, 35) except in particular conditions, or is even eaten by the deer themselves (Darling 2008: 155; Summers pers. comm.), this means that the raw material was harvested in an acute period. Seasonal harvesting of antler was indexical to the agricultural cycle of harvesting crops; of growth and re-growth. Stags become sexually mature only once they shed their velvet and this process has been observed to be directly linked to stimulation of growth of the gonads (Darling 2008: 160–161; Bubenik et al. 2005: 186). The antler cycle will have been a powerful measure of time and renewal in the Iron Age. Deer antler was particularly sought after as a material for working, at least in part due to symbolic considerations of ideas of time, fertility and sexuality (Maxwell 2012). It is perhaps significant that the biography of this object was extended by the prior destruction of another object and the possible time lapse between incising the motifs. In this way the identities of both object and maker/user are re-interpreted and the object's power sustained in everyday life. The fact that this artefact had an extended biography since it is an offcut with subsequent polishing from handling, suggests it was retained as a keepsake or heirloom threaded onto a necklace or bound into clothing as further documentation of its personal and social value.

The observations regarding the possible involvement of multiple individuals and/or multiple time episodes for the incision of different motifs, are embodiments of the performative investment in this object. Rather than a singular male specialist this object was evidentially involved in extended networks of engagement in making, as suggested by Tuohy (2000: 144). It is the repeated enactment of decoration and contexts of use and reuse which were important, not the resulting motifs as decorative and the object as an end product.

## Conclusion

Understanding pigment use and object biographies in later prehistory will undoubtedly be helped by the employment of quantitative methods of Raman spectroscopy and Laser Scanning Convocal Microscopy as presented here. The easy-to-manipulate three-dimensional images generated at high magnification of the object surface by LSCM allows the treatment of the object surface to be examined at high resolution. At the same time it allows accurate measurements to be taken to study in detail tool profiles, surface residues and wear marks.

It has been shown here that the application of these non-invasive and non-destructive quantitative methods significantly contribute to our qualitative understanding of materiality in later prehistoric contexts; the residues and incisions on an object's surface are traces of past performances of making, use and reuse.

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## Chapter 10.1 MATERIALS AND MATERIALITY

Mhairi Maxwell

### 10.1.1 Introduction

Broxmouth boasts one of the largest assemblages of Iron Age material culture recovered from south-east Scotland, second only in quantity to the exceptional assemblage from Traprain Law (Armit *et al* in prep). It consists of 1029 objects of worked bone and antler, pottery, stone, metal (iron and copper alloy) and other materials. Broxmouth has the largest assemblage of saddle and rotary querns in the region (at least 36 rotary and 20 saddle querns including probable examples) and the remarkable worked bone and antler assemblage (362 items) rivals well known southern English assemblages, such as Maiden Castle, Dorset (Sharples 1991) and Danebury, Hampshire (Cunliffe 1995), and the rich assemblages recovered from Atlantic Scotland (eg Hallén 1994). Important comparisons will be highlighted with other sites in this review, but particular reference should be made to the report on the material culture recovered from the Traprain Law Environs Project (TLEP) which sets out the local and regional context within which the Broxmouth material must be viewed (Hunter 2009: 140-156).

The Iron Age material culture from southern Scotland has, until recently, generally thought to have been undiagnostic and mundane, and has suffered neglect as a consequence. The TLEP report attempted to overcome this, considering trends in object use and in the craft activities represented in the various excavated site assemblages. However, since these comparisons are based on generally poor radiocarbon dating sequences from sites with discontinuous occupation, this approach risks conflating developments over time. Furthermore, such broad scale analysis is hampered by a lack of contextual analysis; for instance the presence of certain categories of decorative metalwork and exotica (amber, coral and La Tène brooches) (Hunter 2009: 145, 148) is perhaps a reflection of the varying depositional practices at different sites and the phenomenon of hoarding, rather than a reliable indicator of the presence of these materials (ibid.). Presence and absence analyses, therefore, tend to reinforce the accepted view of emerging hierarchies in the Late Iron Age from previously flatter forms of social organisation (eg Armit 1990: 68-69; Hunter 2007: 15; 2007*a*: 289; Sharples 2003), and the dominance of Traprain Law (Jobey 1976; Hill 1987; Armit 1999; Hunter 2009: 140-156). The reanalysis of Broxmouth's material culture, detailed phasing and absolute chronology are important in allowing us to examine social relations and trends in craft activities, use and deposition over some 900 years of activity. This allows us to review our understanding of social relations in the Early and Middle Iron Age, and leads to re-consider the scale and impact of changes in the Late Iron Age, and the degree of dominance of sites like Traprain Law.

The following review first examines how the excavation strategy and preservation conditions at Broxmouth affected what was recovered; it then examines chronological patterns in material culture before shifting the focus to consider the biographies of materials and their role in identity construction. The final part summarises the materiality of Broxmouth and beyond and proposes a heterarchical social system for the Iron Age of south-east Scotland.

### 10.1.2. Preservation and recovery

Due to its siting on an alkaline limestone outcrop, Broxmouth has a remarkably well preserved worked bone and antler assemblage. Only six other sites in East Lothian have produced worked bone, and only Ghegan Rock has an assemblage of any size (> 20 objects; Richardson 1907). The fact that many items of personal adornment at Broxmouth are made from bone or antler suggests that the apparent absence of decorated personal objects at other sites in the Early and Middle Iron Age may thus be misleading. Whilst the acidity of soils has affected the preservation of bone and antler and other organics on most sites in East Lothian, however, it does not seem to have affected late prehistoric pottery preservation, since the assemblage from Broxmouth (c. 420 sherds, from 109 vessels) is comparable to other Iron Age sites in East Lothian at Phantassie (349 sherds) (MacSween 2008: 150) and St Germains (379 sherds) (Alexander and Watkins 1998: 224-233).

Despite the unusual preservation of bone and antler, the surviving material from Broxmouth remains only a fragment of the range of material which would have been in use. Nonetheless, there is indirect evidence for the presence of other organic materials such as hides, textiles and basketry. Copper-alloy fittings were probably attached to wooden containers or leather straps, and many of the worked bone and antler mounts and handles were originally part of composite objects, the other parts of which were not preserved. We can imagine the range of different textured, warm and cold materials which made up the everyday Broxmouth environment.

### 10.1.3 Phasing and chronology

The Bayesian model (Chapter 9), which supports broadly continual activity from around the seventh or sixth centuries BC to the second or early third centuries AD, provides the first opportunity to understand in detail the development of material culture throughout the Iron Age in one location. However, as has been stressed in the preceding chapters, it is no easy task to unpick the complex stratigraphy. Earlier phases in the interior were truncated by later phases of occupation. Deep stratigraphy was preserved only in the Inner Ditch and south-west Entrance areas. Upper deposits in the former are complicated by the redeposition and movement around site of accumulated middens (Chapter 6), and redeposited material, perhaps around 200 years old, infilled the remains of House 4 and other Phase 6 structures. Residuality, increasing in prominence as time progressed, is an issue in the interpretation of the finds assemblages: for example, it is estimated that around 20% of the radiocarbon dates from Phase 6 are residual (Chapter 12). This should be borne in mind when looking, for example, at ILLUS 10.1 which shows the recovery of the major finds categories by phase at Broxmouth, and in considering the chronological significance of find types appearing or persisting in later phases, since they may in fact derive from redeposited material.

In fact, the quantity and spread of materials recovered in each phase (ILLUS 10.1) to some degree reflects the types and quantities of deposits excavated rather than necessarily providing any deeper insight into the intensity of human activity at the time.

ILLUS 10.2 shows the percentages of each material category found in the major context types. Few artefacts were found *in situ,* and the working areas and floors of most buildings were kept clean except for the occasional loss of small artefacts; a broken bone point (SF263) from Grave 3 in Phase 5 represents the only definite grave good (not shown in ILLUS 10.2) and one of the very few unambiguously *in situ* objects found at Broxmouth. Most of the querns (saddle and rotary) were found re-used in paving, walls and rubble infilling of the houses, meaning that we cannot say whether they were originally used in those houses or elsewhere on site. The range of materials and artefact types, and particularly the large size of the quern assemblage, owes its recovery largely to deliberately infilled negative features, and well-preserved areas of stone construction, particularly the paving and stone walls of Phase 6 (ILLUS 10.2).

Close examination of the contexts in which finds occur highlights numerous acts of structured deposition. Materials found in such contexts, however, can only be used with caution to build up reliable chronologies. For example, three of the finest copper-alloy objects (the horse harness (SF518) and two needles (SF516 and SF531), one of which was broken prior to deposition) were found in a pit outside House 6, deposited along with a rotary quern fragment (SF967), an iron tang (SF585) and a worked bone point and peg (SF262 and SF257). Other nearby pits contained another broken copper-alloy needle (SF519), another rotary quern fragment, this one with pecked decoration enhancing natural limpet scars (SF955), worked bone and antler (including a long-handled comb SF184), iron objects, and fragments of later prehistoric pottery (see Table 7.xxx for complete list). These assemblies of material can be interpreted as a decommissioning event marking the end of occupation of House 6 (Chapter 7).

Similarly, large refitting pottery sherds in deposits associated with Phase 3 could be interpreted as deliberately smashed feasting debris. These sherds were found along with worked bone and antler in various midden deposits, which infilled the ditch terminals at the south-west Entrance, apparently in quick succession, towards the end of Phase 3 (Chapter 4). In these deposits were also large quantities of articulated animal bones and smashed cattle skulls (Chapter 12). Previously Cool (1982), on examining the pottery from Broxmouth and other local assemblages, recognised a typology for late prehistoric pottery, which it was hoped, could be applied regionally. With the addition of more dated contexts and the changes made to the original phasing sequence, the chronological significance of Type 1 and Type 2 has necessarily been re-examined (MacSween and Cool, below). It is now clear that the thinner walled and finer Type 2 pottery is present from at least as early as Phase 3 and persists to the end of the occupation: it is not in itself a strong chronological indicator. Type 1, by contrast, appears dominant in the earlier phases but is very limited in Phase 6, by which point the small quantity of sherds could be entirely accounted for by residuality. We need to be careful in interpreting this shift, however, since the structured deposition of predominantly Type 1 sherds in ditch fills dating to Phase 3 is a product of unusual depositional circumstances, and may be distorting the figures. Part of the difference between Type 1 and Type 2 pottery may thus be due to different contexts of use and deposition rather than chronology.

Despite these caveats, some important patterns in the general development of material culture can be unpicked as we can see from ILLUS 10.1, which breaks down the assemblage by finds type. Notably, rotary querns do not appear until Phase 5/6 (but in secondary contexts, so were probably in use from the beginning of Phase 6 if not earlier), whereas saddle querns were present from Phase 1. The relatively small numbers of saddle querns in Phase 6 are also from secondary contexts and we cannot, therefore, be sure whether they continued in use alongside saddle querns. Stone balls, shale/cannel coal, punch-marked cattle bone (indicative of leather working), pig fibula points, yoke-shafted pins, are all found predominantly in Phases 3 and 5; again, the few occurrences in Phase 6 may simply be the result of residuality. The two objects of horse bone are restricted to Phases 5 and 6. As one might expect, there is a rise in deposition of iron and copper-alloy objects in Phases 5 and 6, indicating the greater availability of these materials at this time.

Various items of personal ornament are found throughout the Broxmouth sequence. In accord with the conventional typologies of Scottish Iron Age pins (Foster 1990), the earliest pin type at Broxmouth was the copper-alloy swans-neck pin (SF514, now lost) from Phase 2. The unusual bone yoke-shafted pins are found later, only in Phases 3-5, and include a ring-headed example from Phase 4 (SF148; ILLUS 10.6.1), a type traditionally associated with Hodson's (1964) Woodbury Culture. Flat-topped pins are restricted to Phases 5 and 6. It seems then, that even before the appropriation of exotica and Roman manufactured or influenced materials, locally made artefacts can be chronologically sensitive, particularly rotary querns, certain types of pins/points, stone balls, and the working of shale/cannel coal.

### 10.1.4 Biographies of materials

*Crops, consumption and craft at Broxmouth and beyond*

Agricultural and craft activities were at the centre of everyday Iron Age life. The cooking, serving and preparation of food was obviously an important daily need represented by the large (for the region) pottery and quern assemblages: the black encrusted residues on various pottery sherds show that they were used for cooking. The unusual bone scoops (SF286, SF287, SF288, SF289, SF438; ILLUS 10.6.5) from Phases 4-6, are perhaps indicative of table manners and the performance of dining. As already mentioned, there is evidence to suggest that the preparation, consumption of food and smashing of pots were part of communal feasting performances at the end of Phase 3.

Bone and antler working, potting, quern manufacture, shale/cannel coal working, the preparation of hides and textiles were all practiced by the community at Broxmouth. Hide working is indicated by staining on some of the worked stone tools (section 10.11), and the awls and splinters of bone which were used as rubbers. Textile working is represented by the needles and long-handled combs, while multi-perforated discs made of scapulae (SF298 in Phase 4, SF299 in Phase 5; ILLUS10.6.14) might have been used to hold threads in place for the weaving of intricately patterned ribbons (Bichler *et al* 2005). Possible basketry tools are also found throughout the worked bone and antler assemblage. These crafts principally made use of locally available materials: the animals reared by the community, local clays, stones, rock and shale outcrops, while cast antler (discussed below) was gathered from the local landscape. Limpet scarring on many of the old red sandstone worked blocks and rotary quern stones reference the local coastline only 600m walk from the site (ILLUS 10.3), where they can be found naturally; nodules of hematite and cobble suitable for tools were picked up here by this author on a recent visit, and clay seams and shale and cannel-coal can also be seen eroding out of the cliffs. In some cases the limpet scars on rotary querns have been deliberately enhanced by pecking (SF955; ILLUS10.7.3 and possibly SF944). The East Lothian plain is punctuated by volcanic outcrops, the most dramatic of which are the basaltic plugs of Traprain Law and North Berwick Law. These were the likely source of abrasive coarse grained stone for making querns and rubbing stones and for the iron ore hematite. The iron bars and slags analysed by McDonnell also suggest that local bog iron ores may have been used for smelting (section 10.14.4).

Broxmouth is especially significant for its early evidence of skilled iron-working in Phases 1 and 2. Only two other sites in south-east Scotland have produced evidence for smelting: at Fishers Road East smelting took place from approximately the 1st to 2nd centuries AD (Haselgrove and McCullagh 2000: 140), and at Dryburn Bridge a small quantity of slag produced from smelting was recovered from secondary contexts dating from around 800 to 400 cal BC (Heald 2007: 81-82). A carbon steel knife found in a Phase 2 context at Broxmouth (SF618) shows that the people at Broxmouth had access to proficiently worked metal, since making carbon-steel requires a controlled and efficient metallurgical process (section 10.14.4). It is possible that Broxmouth was a specialist centre for iron production, and therefore a key player in creating the new social relationships and networks that defined the Early Iron Age in south-east Scotland. A crucible fragment, an ingot mould, and casting debris were recovered from Phases 1, 2 and 4 respectively, and may be evidence for non-ferrous metal-working. Elsewhere, there is evidence for non-ferrous metal-working at Fishers Road East (Lowther 2000: 138- 140), Traprain Law (Cruden 1939: 54) and Phantassie (Lelong 2008: 170), though in each case the evidence is poorly dated: clearly, however, non-ferrous metallurgy was not widely practiced in the region.

Given the local resource availability for most crafts, it is perhaps surprising that many objects evidently had long biographies. The majority of antler and worked stone objects (including cobble tools, whorls and discs) show layered episodes of different types of wear (abrasion, heating, punching, sharpening, cut/ chop-marks, smoothing, polish and scratching). In many cases breakage will have taken objects out of everyday use, but some fractures were subsequently rounded and worn, showing that they were broken some time before deposition, and suggesting that they were kept in circulation. In some instances even broken objects, particularly those made from antler beams and tines, were re-used to make splinter points (eg SF292, SF197, SF456, SF204; ILLUS.10.6.10, 10.6.12). A bone point SF270 (ILLUS 10.6.6) and needle SF365 (ILLUS 10.6.16) illustrate the resourceful use of materials; both were made of old discoloured bone and the latter has traces of as many as four perforation attempts on its shank. Of the other object types, a few were even repaired and re-fashioned including one mount which had an extra perforation added (SF280; ILLUS 10.6.3) and a socketed handle (SF285; ILLUS 10.6.12) was adapted by replacing a longitudinal perforation with a transverse one. Additionally, the decorated bead with ring and dot motif (SF278; ILLUS 10.6.14) was originally part of a handle, and the stem-like tail of a long handled comb was repaired (SF185; ILLUS 10.6.4) - even the breaking of one of the teeth of the latter did not put it out of use, as it was subsequently blunted. The bone point (SF 263), placed on the chest of the woman buried in Grave 3 (Phase 5) at the south-west Entrance, had a rounded break which had occurred some considerable time prior to deposition, illustrating how even broken objects might be valued. Furthermore, the fragmentary nature of the metal assemblage and the deliberately cut iron staple (SF586) are perhaps indicative of recycling.

Querns from Broxmouth were also often efficiently re-used. The handle socket on one upper rotary stone (SF937, ILLUS10.7.2) was damaged, preventing use as an upper, and the concavity of its grinding face suggests re-use as a lower stone (McLaren, below). Another upper rotary quern stone (SF938, ILLUS 10.7.2) was also re-used as a lower stone with a non-matching upper stone with narrower diameter. There are sharpening grooves on four upper rotary quern fragments (SF934, SF958, SF933 and SF960) (section 10.7), and on the lower rotary SF950 (ILLUS 10.7.5) which was placed in paving in House 4: the three linear grooves on the grinding face of this stone faced upwards into the building. There are also longitudinal grooves on the grinding face of SF960b (ILLUS 10.7.3) found in secondary paving in House 3, suggesting re-use as a sharpener. These sharpening grooves are not present, however, on its refitting partner SF960a, which was placed over the post-pipe of a substantial post-hole in the same house.

There are three other instances where refitting fragments from the same quern occur in the same contexts. Two fragments of saddle quern SF904 were found in positions which demonstrate that they were fragmented before deposition; one was placed on top of the other in a pit in House A (Phase 1). Two fragments of saddle quern SF913, were recovered from a shallow depression in the same building. The most striking example, however, is formed by the two refitting fragments of lower rotary quern stone SF943 which had quite separate biographies; one has clear evidence of exposure to heat or burning on its grinding surface, and had been exposed and damaged before finally being deposited in a pit in House 2 (Phase 6) with its refitting partner. These practices of structured deposition and deliberately extended object use-lives show that materials appropriated from local networks of engagement were nonetheless highly valued.

Indeed, it has often been argued that the agricultural cycle was central to Iron Age cosmology and mirrored the human cycle of life/death (Bradley and Yates 2007; Hingley 1997: 23-26; Lelong 2008: 239-268). At Broxmouth, the deposition of the majority of broken artefacts in the middens which infilled the hillfort ditches and houses might be understood as a means to mark transitional stages in the biography of a community/household whilst ensuring its continuity and productivity. One interpretation of the residual material occurring in the terminal deposits of the Phase 6 roundhouses is that middens were used to infill them prior to their refurbishment or abandonment. The deposition of midden, which could productively be used as fertiliser on the fields, harnessed the powers of materials (particularly pottery, querns and bone artefacts) associated with, or even made from, the products of the agricultural cycle. Additionally, sharpening metal agricultural tools on rotary quern fragments (primarily used to grind the staple grain) was perhaps not only pragmatic but also regarded as an act which would encourage the success, growth and renewal of the community via crops and metallurgy.

Materials found at Broxmouth embody the agricultural and life cycle of animals, and potentially, therefore, beliefs of life and death, fertility and renewal. Animal bone would have been available from butchered carcasses on site (section 10.6), for instance a perforated cattle tibia point (SF303; ILLUS 10.6.14) shows evidence of butchery at its epiphyseal end. The antler used at Broxmouth, however, was not from hunted stags, but was naturally cast and gathered from the local landscape (probably the nearby uplands of the Lammermuirs). The rutting season of stags occurs in autumn (ILLUS 10.4), the time when spelt wheat, one of the most common Iron Age crops, was sown (Van der Veen and Jones 2006: 224). Deer then cast their antlers in the following spring, as dictated by their fertility cycle (Price and Allen 2004: 810). The agricultural cycle and the sexuality of stags were, therefore, intimately linked. Furthermore, experimental work suggests that antler was soaked before working at Broxmouth, and this process excretes a bright blood red substance (Maxwell 2012). Red had an important symbolic currency linked to warfare, violence and life/death in the Iron Age and was incorporated in many items of Celtic Art (Giles 2008). Furthermore, red is the most important colour change in iron-working, telling the smith that the correct temperature has been reached in order to hammer, bend or twist the metal (Rehder 2000: 12).

It has been argued that iron-working in the British Iron Age was integral in the ‘forging’ and ‘tempering’ of social roles and relationships throughout the life course linked to successful agricultural productivity and cosmologies of creativity and renewal (Giles 2007). Non industrial iron-working is frequently described in recent ethnography in explicitly violent and sexual terms. For example, among the Toro in western Uganda, Africa, it was said that if you slept with your wife or girlfriend during the smelt ‘the ore would die’ (Childs 2000: 220). Menstruating women were banned from the smelt, while the blood of a sheep was sprinkled around the furnace and those who were permitted to take part in the smelt. Two sets of bellows were used, one of which was female, with breasts, the other male with phallus (ibid: 216). Throughout Iron Age Britain, antlers and iron were used as construction and agricultural tools, and iron adzes are often found deliberately deposited in structural contexts (Hingley 1997: 13-14). However, very few agricultural tools survive in the south-east Scottish archaeological record, probably because they were kept in use and ultimately recycled (Hunter 2009: 144), which in turn may reflect their value in society and local expressions of beliefs linked to fertility and renewal of materials and people.

Such beliefs were perhaps enacted in the potential use of Samian for making pigments (a native use for pigment which has been suggested cf Hunter 2007: 37) and their inclusion in closing deposits. For example, a Samian base sherd which had parts of its footring chipped off before deposition (SF141), was included in the terminal infill deposit of House 7; a deposit which also contained a human left radius midshaft with a peri-mortem fracture (Chapter 11). Grinding down ferrous rich Samian would have produced a red pigment similar in smell, colour and substance to blood, the significance of which was likely linked to violence, and to beliefs of fertility, also expressed in antler and iron-working. Inter-personal violence was evidently a part of Iron Age life; weapons are found throughout all phases of activity at Broxmouth, including bone spears and ferrules, some of which are broken and worn. The 22 disarticulated human remains, 13 of which were skeletal fragments from the skull, may be the victims of this violence. They were found in a variety of midden, occupation, and ditch entrance terminal deposits, and display a high proportion of peri-mortem fractures (Chapter 11). Interestingly, a further human cranial fragment displays deliberate modification in the form of a straight edge, cut after the death and decomposition of the individual. One of the three Samian fragments from the Phase 6 hoard in House 1, has also been deliberately chipped and ground down. The Romano-British glass bangle fragments from this hoard are also particularly interesting. As well as the three fragments of Samian, a piece of Roman bottle glass was included. Bruhn (section 10.17) argues that the bangles were worn by at least two individuals, probably by adolescent women (ibid). The bringing together of these bangles may have been part of a social re-structuring event, the deposition of the hoard marking a period of transition linked to the coming of age and fertility of females. The deposition of this hoard is one of the latest events in the Phase 6 Interior at Broxmouth.

*Identities and social relationships beyond Broxmouth*

Antler working debris and roughouts for objects of worked bone and antler are indicative of the creation of objects for everyday use (needles, points, handles for tools, antler picks and hafts, pedicle smoothers and punched surfaces for leather working) and for adornment (mounts, pendants, beads, and the yoke-shafted pins), the latter possibly for exchange with other communities. The bangles, beads and pendants made from shale/cannel coal in Phases 3 and 5 and a bead roughout (SF284; ILLUS 10.6.3) from Phase 6 show that personal ornaments were also made from these materials at Broxmouth. People were concerned with their personal appearance as indicated by the perforated 'moustache' comb (SF187, ILLUS 10.6.3) and the possible copper-alloy tweezer fragment (SF533), both probably used for personal grooming, and the items of jewellery which were well-used judging from the worn perforations of bead SF278, the smooth inner surface of decorated spiral bone ring (SF277), and the surface scratches and wear on the tips of many of the pins. More unusual objects include a perforated pig incisor pendant (SF280, ILLUS 10.6.3; Phase 3), a bracelet fragment made of three strands of copper-alloy twisted together (SF520, ILLUS 10.13.1, Phase 3/4), a bead of pink/orange coral (SF691, ILLUS 10.18.1, Phase 4), a pendant of scapula (SF283, ILLUS 10.6.3, Phase 5) and the possible nose-plug (SF279, ILLUS 10.6.3, Phase 6). No other parallels for yoke-shafted pins are found anywhere in Scotland, but there are comparable examples from Woodeaten, Yorkshire, and sites in Wessex (Hunter, below), indicating that social relationships were established with other communities far beyond Broxmouth.

The decoration and colours of objects were outward expressions of identity. A yellow stain in the cup on a stone block (SF981, Phase 3) and a red-brown stain on a possible palate (SF1033, Phase 4) may be evidence for the mixing and preparation of pigments. Personal objects were occasionally enhanced with decoration, and when worn in social arenas they will have been experienced up close, and thus played roles in establishing inter-personal relationships. A penannular brooch fragment (SF517, now lost), found in a Phase 6 pit, had components made of different copper-alloy compositions (gunmetal and bronze) (section 10.14), perhaps for their different colour properties. The earliest decorated objects are from Phase 4, which includes theantler ring-headed pin (SF148; ILLUS 10.6.1); a skeuomorph of metal examples, including the ring-headed pins from Traprain Law (Burley 1955-56: 171) and Rhodes Links, East Lothian, the latter with very similar globular and parallel line decoration around the head (Richardson 1907: 429-430). Another interesting example perhaps indicative of relationships further afield from this phase is the antler bead re-made from a handle with eight ring and dot motifs around its circumference and enhanced with black pigment (SF278; ILLUS 10.5). This bead is a skeuomorph of Guido's classes of glass beads with contrasting coloured ring and dots around their circumferences; particularly Classes 2 and 4 which are thought to be of continental origin or influence and also the Class 10 glass beads found concentrated at Meare Lake Village, Glastonbury which she believed influenced beads found mainly in North-east Scotland (Guido 1978: 48, 51, 79, 85). Laser scanning microscopy has shown that potentially more than one compass tool was used to incise the ring-and-dot motifs on the antler bead (SF278), and therefore potentially more than one individual was involved in its decoration (Evans et al 2012). It is difficult to comment on whether a compass was a specialist tool, as there is only one surviving Iron Age example in Britain, from Fairy Knowe, Stirlingshire (Hunter 1998: 366), but this suggests a more widespread use of this tool most often associated with intricate bone working (as seen on a comb from Ghegan Rock, East Lothian (Laidlay 1868: 375)) and metal objects of Celtic art. Indeed, the skeuomorphs indicate that antler, glass and metal (iron and copper-alloy) shared material properties and qualities.

Despite actively taking part in wider Iron Age fashions, the expression of local identity was important to the people at Broxmouth. As already mentioned, limpet scarring on many of the old red sandstone worked blocks and rotary querns reference the local coastline. In some cases the limpet scars on rotary querns have been deliberately pecked to make them more obvious (SF955 and possibly SF944), and can therefore be recognised as a distinctly local decorative motif. In House 7, an upper rotary quern (SF936) was placed with its limpet scars showing. Similarly a rotary upper quern fragment from Knowes (SF104) was deliberately placed in paving with its limpet scarred and pecked hollows showing (Haselgrove et al 2009: 71, fig.5.5). Type 1 and Type 2 pottery, distinguished by their coarser thicker walled and finer thinner walled forms respectively, can be found across East Lothian and are also indicative of a regional tradition. However, reanalysis of the pottery assemblage has brought to attention the local variability in the fabrics (section 10.1.4). Additionally, analysis of visible residues encrusted on the surfaces of both types of pottery from three sites (Broxmouth, Newmains and Traprain Law) (section 10.2.5), suggests that culinary practice was not necessarily a regional tradition but was potentially site-specific, since markedly different patterns of combinations of plant, terrestrial meat, and other lipids were obtained from each site. This suggests that fabric and form was not primarily a functional consideration, but that the differences between Type 1 and Type 2 could be the result of individual, household or community potting preferences, or their differing access to clay and temper resources which were perhaps ancestrally or territorially controlled.

The people at Broxmouth in Phase 6 had access to Roman materials, and a particular concentration was found in a hoard associated with House 1. Additionally the Phase 4 coral bead (ultimately of Mediterranean origin) came into the possession of the inhabitants of Broxmouth via a long-distance network of engagement. Other objects indicative of participation in wider identities include the open-cast copper-alloy horse harness (SF518; ILLUS10.13.1) found in a Phase 6 pit just outside the entrance to House 6, the penannular brooch fragment found in a pit in the Phase 6 interior (SF517), and a Romano-British bracelet recovered from a sieved sample deriving from the terminal infill of House 2 (SF 521). More than 40% of the excavated sites in East Lothian had access to Roman materials, but they were often re-worked in distinctively native ways (Hunter 2009: 141). For example, Samian sherds were re-made into whorls or counters at Traprain Law, and are often abraded, chipped or ground perhaps for use as pigments (Robertson 1970: 208; Hunter 2000: 301). Although the communities of Broxmouth and their neighbours were plugged into wide networks of engagement, and new materials brought with them new affordances, people did not simply adapt to Roman ways of being. These materials were physically re-worked in ways particularly appropriate for indigenous Iron Age cosmologies and identities. Additionally native people were selective about the 'Roman' objects and materials that they appropriated, choosing those that were familiar to them: for example, the silver spiral finger ring found in Phase 5/6 at Broxmouth (SF 615; ILLUS10.13.1) is reminiscent of the spiral bone ring (SF 277) found in much earlier Phase 3 midden. This ring should be illustrated?

### 10.1.5 The materiality of Broxmouth

Curation, recycling and acts of structured deposition illustrate the important role of materials in creating and maintaining social relations. Agricultural activities were at the centre of Iron Age life, providing a ready resource for materials, and it is perhaps not surprising that the materials used to make artefacts often ended up recycled in middens or in the construction of houses. Cyclical ideas of fertility, renewal and productivity were thus central to the individuals, households and communities of the south-east Scottish Iron Age, as has often been argued for the British Iron Age more generally (eg Hingley 1997; Parker-Pearson 1999; Giles 2007). An appreciation of the biographies of materials at Broxmouth has built up a picture of an adaptable and sustainable society which took an active part in wider Iron Age social networks. This leads us to re-examine the accepted development from flat egalitarian social relationships to emerging hierarchies in the Late Iron Age.

Similar food preparation and consumption, domestic and manufacture activities were represented across all 92 sites included in Hunter's summary of Iron Age sites in lowland Scotland (2009: 140-156). The evidence for iron-working at only a minority of sites (eg nine of 32 excavated sites in East Lothian) and limited access to certain categories of decorative metalwork and exotica (eg amber, coral and La Tène brooches)

(Hunter 2009: 145, 148), hinted at status differentiation, at least by the Late Iron Age. Traprain Law exceeds all other excavated Scottish Iron Age sites in its wealth and breadth of exotica, and is therefore envisioned as the dominant player in the Late Iron Age social system (eg Hunter 2009: 156). The visibility of these categories, however, may have much to do with the varying use-lives of objects, as the site-specific results from residue analysis of pottery from Broxmouth, Newmains and Traprain Law demonstrates (section 10.2.5), and depositional practices including the phenomenon of hoarding which became common at this time (ibid): the latter is represented at Broxmouth, for example, by the hoard of Roman material associated with House 1.

By examining the biographies of objects from Broxmouth, it has become evident that social relations were not stable. There is evidence for warfare, the exploitation of different resources in different phases (ILLUS 10.1), changing networks of engagement in craft and consumption, while objects were recycled, re-used and even re-designed. The presence of personal decorative and skeuomorphic items of bone throughout all phases at Broxmouth certainly calls into question the supposed increase in individual expression and the emergence of new hierarchical power structures in reaction to Roman contact (Armit 1990: 69; Sharples 2003; Hunter 2007:15, 2007a: 289). Rather than a flat society in the Early and Middle Iron Age, an adaptable heterarchical society seems more applicable, where relationships of power and knowledge are contested and flexible. Importantly, heterarchy can only be interpreted and understood when relationships are examined over time, and this is why the biographical approach taken to examine the materiality of the south-east Scottish Iron Age is important, whereas the interpretation of hierarchy is not only atemporal, but is dependent upon the analysis of a singular network of social relationships. For instance if we were to focus on iron-working as an indicator of status, Traprain Law would not figure (there is no clear evidence for iron-working here), whereas Broxmouth in Phases 1 to 4 and a few other sites would emerge as dominant. Rather, in reality, there is the space for more than one set of relationships, which may be hierarchical in nature, to operate at the same time.

The implications from this re-appraisal of the Broxmouth assemblage need to be tested at other sites using detailed radiocarbon dating strategies targeting the potentially chronologically sensitive material categories outlined above, and the primary contexts of their manufacture and use. At the same time, however, we must also consider materiality: the ways in which people appropriated, used and valued materials.

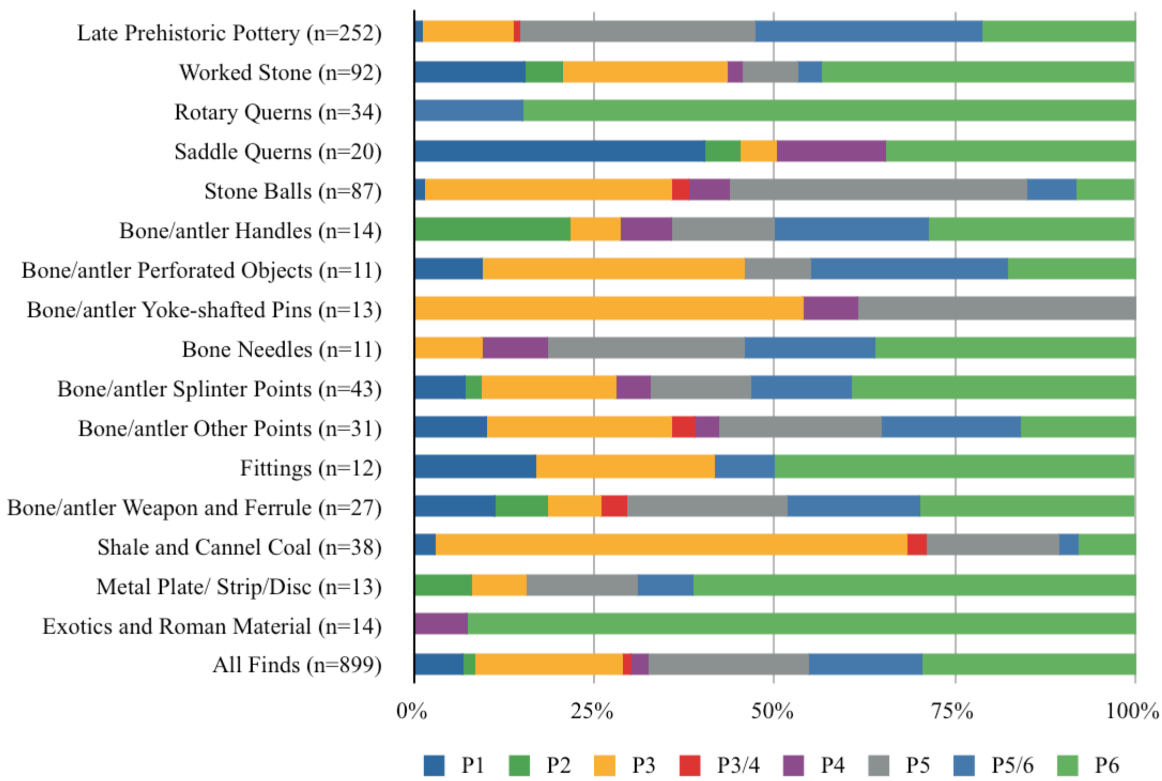


**Table 10.1:**
The main material categories found at Broxmouth by phase. Residuality is a major factor, especially in Phases 5 and 6, though some significant patterns can be picked out (see text).

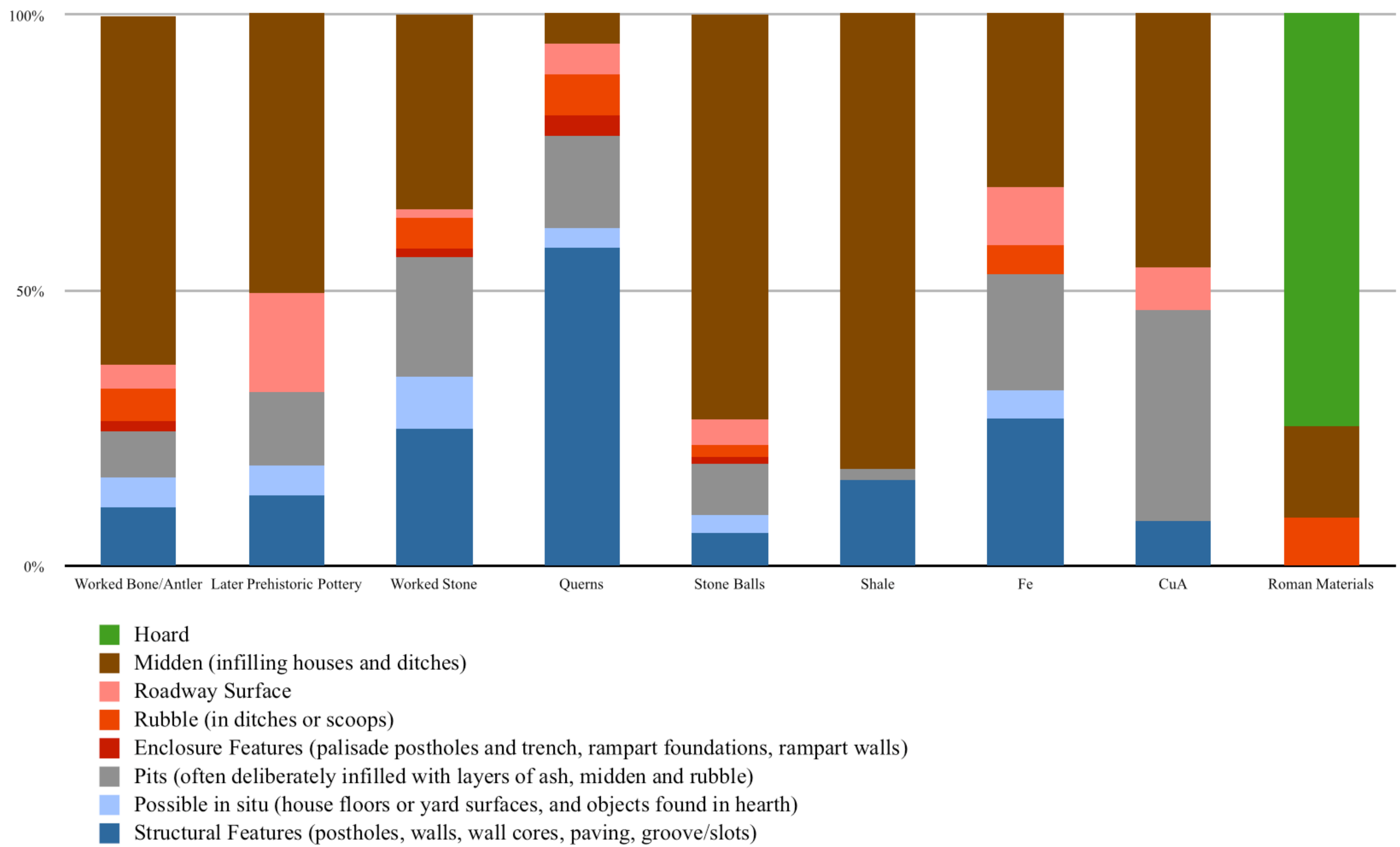


**Table 10.2**:
The % of each type of material found in the various types of contexts excavated at Broxmouth.

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**Useful and Social Pots: Residue Analysis of South East Scottish Iron Age pottery.**

### 1.1 Introduction

Understanding the social role of artefacts through time, including pottery, has been limited for the prosaic and largely undiagnostic assemblages which typify the Iron Age of South East Scotland. Analyses which may indicate functional distinctions within these assemblages may therefore be of particular value.

The majority of the material culture from the region is considered undiagnostic. Furthermore, despite the presence of regional styles of quern manufacture and decoration (Hunter and McLaren 2008), the transition from saddle to rotary querns is not clear cut due to a lack of securely dated contexts (Armit 1991:191-192, McLaren and Hunter 2008) and their extended biographies. Importantly, Cool when working on the coarse pottery from the excavations at Broxmouth Hillfort recognised two different types of pottery, mainly distinguished by fabric, which she argued to be chronologically significant (Cool 1982). This typology has since been widely, though cautiously, adopted for the Iron Age in South East Scotland (e.g. Alexander and Watkins 1998:

224-233). Additionally, wet hand slipping on the coarseware at Traprain Law has been noted to be potentially chronologically sensitive (Macsween unpub rep.).

Therefore, in order to advance our understanding of the development of material culture throughout the Iron Age of South East Scotland a study of the relationship between pottery form, function and social role is necessary in order to see whether there is a meaningful typology which may be adopted with more certainty. The radiocarbon dating strategy as part of the Broxmouth Hillfort Project suggests that Type 1 is earlier from 400BC and that Type 2 becomes more popular later in the phasing appearing at the earliest c.200BC according to the stratigraphy and dated contexts (Armit and McKenzie in prep. 2013); however residuality is an issue as the radiocarbon dates of House 4 show that c.150-200 year old midden was used to infill on abandonment which may explain the occurrence of more Type 1 pottery in this instance. At the same time, both types were in use concurrently from phase 5 (discussed further in section 2.1). The sherds from the recent excavations of Traprain Law also form part of an AMS dating strategy (Armit et al forthcoming), all sherds were taken from the Late Iron Age contexts at this site. Vessels of both coarse and finer fabrics from 3 different sites will be examined using the technique of residue analysis to understand their function and if this is related to choices in form and fabric. This project hopes to determine whether change in pottery form and fabric coincided with change in pottery function and/or social role through time.

**1.2 Question and Aims**

Is there a functionally sensitive typology of coarse native pottery from the Iron Age of South East Scotland?

- To investigate the function and social role of later prehistoric pottery in SE Scotland through residue analysis on a representative sample of sherds from three excavated sites, Broxmouth, Traprain Law and Newmains.
- To determine whether change in pottery fabric and form coincided with change in pottery function over time. Fabric is seen as the most significant factor (section 2.4).
- To assess whether a typology of Iron Age coarseware can be chronologically applied.
- To make comment on whether functional preferences for pottery appear to vary between sites.
- The potential for all of the above to improve understanding of pottery use and chronology in the region.

**1.3 Background to Method and Sites**

Gas chromotography mass spectrometry and compound-specific stable-isotope analysis of lipid residues taken from pottery samples will detect the consumption and/or storage of plant, animal or marine resources. Additionally modes of exploitation and preparation may be detected by distinguishing between ruminant dairy fats, ruminant fatty tissues and porcine (pig) fatty tissues, illuminating the character of mixed economies and possible varied exploitation. This information will be considered in light of the respective site faunal assemblages. Any associations of particular residues with distinct pottery fabrics, coarse or finer, and falling within the characteristics outlined by Cool for Type 1 and Type 2 (see section 2.2 below) will be examined. Secondly, the results will also be contextualised via the dating projects of the Broxmouth RadioCarbon re-dating programme and the AMS dating programme of pottery sherd residues from Traprain Law, detecting any changing patterns of pottery use through time. This project will be a valuable contribution to the debate on the nature of subsistence economy, society and materiality of Iron Age south-east Scotland.

The three pottery assemblages to be sampled are from the settlement sites of Broxmouth (Hill 1982, 1995), Newmains, Whitekirk (unpublished) and the recent summit excavations on Traprain Law (Rees and Hunter 2000, Hunter and Armit forthcoming), all in East Lothian. The three sites are chosen for their well preserved assemblages representative for the region as a whole and rich in sooted, residue-rich sherds. All three assemblages are associated with good settlement evidence, with potsherd size and distribution in all cases suggesting local discard related to on-site activity. The project covers a range of site-types and a time depth from the Early to Late Iron Age. The project proposes to take 20 samples of Iron Age context sherds from Broxmouth and 10 each from Newmains and Traprain Law.

**1.4 Method**

The lipid analysis followed established protocols. Briefly, ceramic powder (~1 g, then after preliminary results ~2 g) was drilled from the interior surface of each potsherd and extracted by sonication and placement in a centrifuge for 10 minutes at 2000 rpm with 3 aliquots of dichloromethane:methanol (2:1 vol/vol; 5 mL). The solvent extract was separated from the powder and an internal standard (10µl of a hexane:tetratriacontane) added. The solvent was removed by evaporation to dryness under N2 (40 ºC) to obtain a total lipid extract (TLE). An aliquot of each TLE was silylated (by adding 3 drops of *N,O*—Bis(trimethylsilyl)trifluoroacetamide (BSTFA)) and analyzed by gas chromatography-mass spectrometry (GC-MS).

**2.1 Choice of Samples for Residue and their Dating:**

All of the analysed sherds, with their individual find descriptions and results, are included in Appendix A. Drawings of the sherds before drilling are included in Appendix B.

Representative coarse and finer vessel profile samples from the 1996-97 and 2006 Traprain Law excavations (Armit et al forthcoming, Rees and Hunter 2000) were chosen from stratified layers directly associated with settlement evidence to investigate on-site vessel use in relation to fabric and secondarily form, identifying any chronological developments. The sherds chosen for analysis from Traprain Law come from the Late Iron Age.

Although stratigraphic information for Newmains is limited, the different characteristics in pottery fabric and form make this a good comparison to the assemblages from Traprain and Broxmouth in order to understand variability in site activity and whether fabric and form dictated function. The inclusion of this unpublished site in the project places it for the first time in its regional context. Other artefacts from this site support

Middle to Late Iron Age occupation. Again representative samples from vessels of coarse and finer fabric will be chosen.

From Broxmouth sherds from the Interior, South West Entrance and Inner Ditch area will be sampled covering the different phases of activity at this site, c.800 years of the Iron Age. A radiocarbon dating programme as part of the Broxmouth Hillfort project has refined the dating sequence, showing that Type 1 was popular in earlier phases, and that Type 2 was a later addition though it is likely that Type 1 also remained in use for some time contemporaneously. This chronological development is however difficult to ascertain due to the fact that pottery fragments are found in secondary contexts, mainly in middens, and not in primary or *de facto* contexts (for example in hearths or in refitting groups on floors). Therefore it may be that either type may be occurring in residual or re-used older deposits (as is known in the case of House 4), therefore making it very difficult to see a clear chronological development. It may also be that Type 1 was associated with feasting in phase 3, as the Type 1 pottery in the South West entrance in this phase is included in a major ditch infilling episode in which were articulated sheep and cattle bones and smashed cattle skulls. This is another important reason why this project will be useful in order to understand whether Type 1 and Type 2 were used and engaged with differently, perhaps illuminating different roles or episodes of activity of sites at different times. Potentially this can inform regional chronological developments throughout the Iron Age.

### 2.2 Type 1 and Type 2 Form and Fabric Characteristics

The following descriptions of Type 1 and Type 2 pottery are from the Broxmouth Hillfort archive (to be deposited with RCAHMS) and Cool's 1982 paper on the finds from Broxmouth. This has been influential in defining an Iron Age typology for coarse pottery in East Lothian.

*TYPE 1*

Bucket shaped with flat base and simple flat or rounded rims that may be straight or inturned.

- Very coarse and heavily gritted fabric.
- Angular grits which may be 1cm or more in length.
- Coil technique.
- Unevenly smoothed on the inside and the outside.
- Patchily fired with reduced grey interiors and oxidised orange to buff/grey on exterior. Some Type 1 vessels show a thin black layer on the surface (not as common as in Type 2).
- Thick walls, sometimes as thick as 2cm.
- Intermittent use of grass temper.

*TYPE 2*

Bucket or barrel shaped with walls sloping out from a flat base and simple rounded or flattened rims gently incurved. *There is a known Type 2 vessel (no.116) from House 5 which has a very upright rim and a sherd now lost (no 48 in 1995 draft rep) with an out-turned rim.*

- Finer fabric with sandy feel to it.
- Grits are smaller, generally less than 0.3cm long with some long larger grits scattered throughout but these tend to be isolated.
- May be coil built, but not as evident as in Type 1.
- Fired with reduced grey cores and oxidised buff/orange surfaces. The outer surfaces 'not in frequently' have a very thin black layer over the oxidation.
- Thinner walls, range from 1cm to 2cm.
- Intermittent use of grass temper.

The characteristics shaded in grey are extremely similar to both Type 1 and Type 2.

**2.3 Fabric as the Most Distinguishable Typological Characteristic**

- Type 1 and Type 2 are distinguished mainly from their fabric: Type 1 is coarser and with more uneven surfaces, while Type 2 is finer with smoothed down surfaces.
- Form can vary in thickness, rim type (inturned or flat) and both probably used coil building technique.
- Firing can in both cases be patchy and variable.
- Both vessel types were made using the same resources.

Therefore, without results from the residue analysis, a typology can only be based with certainty on the observations of fabric and inclusions; coarser Type 1 and finer Type 2. Additionally variation between forms (rims, thicknesses and shape) increases when comparisons are then made to other sites. For this reason vessels chosen for residue analysis were based primarily on fabric choosing a selection of vessels with finer and coarser fabrics, which are also from vessels which can be reconstructed (see section 2.3) falling within the variable Type 1 and Type 2 forms outlined by Cool (given in brief above).

**2.4 Whole Vessel Use Reconstruction**

Since our question is concerned with how potential Type 1 and Type 2 pots were used, sherds from the same vessel from which profiles can be reconstructed were chosen for analysis: represented by a sherd from the rim or base and a body sherd (in some cases all three of rim, body and base can be analysed). This will mean that we can potentially understand the residue absorption into different areas of the vessels (base, body and rim) to illuminate modes of cooking. This level of understanding will make a fairer and more detailed comparison of vessel form and use between sites.

After the preliminary analysis, it was found that the best preserved residues were in the rim sherds of the pottery. Therefore rim sherds were preferentially selected for analysis, meaning that unfortunately profiles of pottery use could not be reconstructed.

**3.1 Taphonomy**

The three sites from which sherds will be analysed all lie on different geology. Broxmouth is upon a limestone outcrop, Traprain Law upon a basaltic volcanic plug and Newmains is situated in the fertile Old Red Sandstone lowlands. This will be borne in mind as a potential factor affecting the preservation of residues.

**4.1 Project Timetable and Costing**

Analysis will be undertaken by M Maxwell, supervised in the lab by Professor Carl Heron (University of Bradford) and Mrs Belinda Hill. Analysis of the Broxmouth samples begins in January 2011 and provides a template for the current proposal as follows: 1. Drilling the pot: approximately 3 days. 2. Solvent extraction: 2 days. 3. GCMS: 1 day. 4. Data analysis: approximately 3 days (including training for M Maxwell).

A significantly reduced cost only rate of £70/sherd is offered by University of Bradford, in recognition of its hosting of the HS-funded Broxmouth Project and the CDA student M Maxwell doing much of the work. The cost of the analysis and therefore the Society's contribution represents excellent value for money. It should be noted that the comparative analysis of the Broxmouth assemblage is funded by Historic Scotland via the Broxmouth Project.

£1400 has been provided by the Society of Antiquaries of Scotland to cover the direct cost of preparing and analysing 20 residue analysis samples from sherds from the sites of Newmains and Traprain Law.

**5.1 Results**

The variables to be borne in mind for interpretation are:

- Fabric, roughness and porosity
- Form

- Date
- Biography of pottery
- Geology
- Conservation and storage issues.

### 5.1.1 Preliminary Results from Broxmouth Samples May 2011

Broxmouth samples 010 to 015 and 017 to 018 (samian) and one blank all returned no evidence or negligable traces of preserved residues. Contaminants including plasticisers were present, and were also found in pottery blank. Archaeological context (midden, floor deposits, hearth or pit) does not seem to have affected results.

It is unexpected to find little or no evidence of any residues. It could be that pots were used in a way not involving the absorption of residues (such as dry cooking, grain drying, etc), but this does not correspond with the evidence of encrustation and residues seen on many of the pots. Laboratory method, size of sample area and perhaps taphonomy (due to Broxmouth being situated on alkaline limestone) may be other factors.

### 5.1.2 Plan for Second Run of Samples June 2011

In order to test whether the lack of evidence for residues is real, two sherds from two groups of coarse Broxmouth sherds were re-assessed (ELN, Type 1 and FCX, Type 2). They were drilled close to the rim where residue is often better preserved, and the sample size doubled to 2g with a larger area extracted. This was carried out under direct supervision, to minimise the intrusive laboratory contamination or potential methodological error.

Alongside this, two rim sherds from Traprain Law (SF415 and SF504) with good interior encrustation and two rim sherds from Newmains (one with good interior encrustation from Area A (SF175), the other with none but slight sooting/ residue on exterior from Area B (SF265)) were sampled using the same method. This was to assess whether preservation of residues differs between sites.

Isotope studies on the encrustation will also be carried out on the samples from Traprain Law and Newmains.

**5.2 Preliminary Results from June/July 2011**

**Broxmouth:**

The results from both Broxmouth samples show abundant C16 and C18 fatty acids. Otherwise preservation is poor. Plasticisers are present and squalene, which derives from handling. Cholesterol is also present, but we must be cautious in interpreting this since cholesterol can also be found from fingers from handling. There are hydrolysis products (MAG-16 and MAG-18) from degraded fatty acids. Therefore we have some evidence for terrestrial lipids, and no real evidence for plant sterols or aquatic lipids.

Fabric does not seem to be an issue since the results are similar between the Type 1 and Type 2 samples.

**Newmains:**

There are lots of lipids in the Newmains samples, including large quantities of fatty acids (C14, C16, C18, C18:1) and some shorter chained fatty acids (C6, C7, C8, C9). This is what is expected from degraded terrestrial animal adipose tissue. There are also some plant sterols and MAG-18, suggesting some plant derived lipids. No evidence of aquatic lipids.

Plasticiser is present in lower quantities than the Broxmouth samples.

**Traprain Law:**

There is good preservation of a large amount of lipids in the Traprain Law samples. The fatty acids preserved in large quantities are characteristic of ruminant adipose tissues, also present are degradation and oxidation products of C18:1. There are also ketones indicating the cooking of fatty tissue at high temperature (over 300°C) for long periods. There is a possible small trace of plant sterols, for example the presence of A28 (octacosanol, an altered form of cholesterol). Plasticiser is present, but in much smaller quantity than in the Broxmouth samples, and less than in the Newmains examples.

All analysed sherds were rims, and so location from vessel profile was not a variable. The similar results from both Broxmouth samples, one a remarkably rounded and inturned rim with coarser grained Type 1 fabric and the other a flat very slightly inturned rim with Type 2 fabric, did not affect the results. Therefore biographies of pottery, geology, conservation and storage issues are the probable variable factors, rather than Type 1 and Type 2.

In both the Newmains and Traprain Law samples there is less plasticiser indicating less potential problems introduced from conservation and storage issues affecting lipid survival. Therefore, the question of whether form and fabric have different or varying quantities of absorbed lipids preserved according to fabric type need to be explored further through the good results attained from Newmains and Traprain Law. Eight more rim or body sherds from each site were analysed. This was to ascertain whether or not vessels of different forms and fabric had different uses and biographies at these sites. This does not seem to be the case at Broxmouth (though the preservation of lipids is poor at this site).

**Isotopic Analysis Results:**

All samples returned a range of 2-4% nitrogen, this suggests that terrestrial meat was being cooked. The carbon was fairly consistent between all samples.
Broxmouth: there was lower percentage of Nitrogen, but still terrestrial markers.
Newmains: there was a higher percentage of Nitrogen, which could be from modern land-use or archaeological manuring?
Traprain: lower than Newmains, but slightly higher than Broxmouth; terrestrial. No issue of modern manuring or land-use here.

### 5.3 Results from September 2011

Five more sherds from Newmains were successfully analysed (NEW011-NEW015), and two more sherds from Traprain Law (TRAP003 and TRAP004).

At first eight sherds from Newmains were analysed (NEW003- NEW010) but unfortunately during sample preparation a technical error occurred with the sample concentrator outwith the control of the lab technician and myself. Not surprisingly, despite attempts to re-extract from the drilled samples, any residue which was there was now lost. Luckily an extra amount from a drilled sample had been kept and three samples were re-drilled (with permission from Dr. F. Hunter), and a back-up sherd which had been taken on loan just in case, were used for another sample run.

**Newmains:**

Plasticiser is still present in most of the samples. The results from three of the samples (NEW011, NEW012 and NEW013) were very similar and the best results achieved so far! There are high quantities of C16 and C18, characteristic of animal (likely adipose) products, alkanes and phytanic acid characteristic of ruminant animals. Ketones are also present, indicative of cooking at high temperatures (NEW011 and NEW015 low levels, NEW013 high levels). Very interestingly there is also evidence for ricinoleic acid present in markedly high quantities in four out of five samples (not present in NEW014), which could be indicative of castor oil or ergotism/ fungal attack (discussed in section 6.1). There was no ricinoleic acid present in the previous analysed Newmains sherds (NEW001 and NEW002) and it is not found in any of the sherds from Traprain Law or Broxmouth.

There are also traces of smaller chained lipids in NEW011, NEW012, NEW013 and NEW015 characteristic of plants. NEW014 is markedly different according to its lipid profile. This sherd has no trace of cholesterol, and has little or no residue preserved in the sample. This is likely a quantification issue regarding the lack of lipids preserved in this sample, rather than true absence. Alternatively, it may suggest a different use for this pot, possibly for storage of dry foods. Interestingly NEW014 is very similar in fabric and form to NEW013, which has high ricinoleic levels. Therefore fabric and form do not seem to dictate how the pots were used or alternatively to affect the residues absorbed.

**Traprain Law:**

The results from TRAP004 are really interesting as it is extremely rich in residues, very similar to TRAP001. These sherds have similar % of temper and are similar in their sandy clay fabric; one is very slightly finer (TRAP004) than the other. In these samples are plenty of C8, C10, C16 and C18 lipids characteristic of animal adipose. Also present are mono-glycerols and di-glycerols, and traces of ketones. There are traces of plant waxes. Intriguingly there are sugars preserved in TRAP004 which do not normally survive in archaeological samples.

The results do vary slightly between the two sherds TRAP003 and TRAP004 and this may be linked to fabric, morphology and function/ pottery biographies at this site.

TRAP005-TRAP008 all share very similar lipid profiles comparable to TRAP003, indicative of highly degraded heated fats. These sherds are all of varying fabrics and % of temper. C18:0 dominates suggesting the fats derive from ruminant animals. Also present are C14:0, C15:0, C16:0 and small amounts of ketones, indicative of animal fats cooked at high temperature. TRAP009 is markedly different, with no fatty acids preserved.  This may suggest a different use for this pot, perhaps for use as storage. This use is not linked to fabric since TRAP009 is similar in fabric to TRAP 007 which has fatty acids present. At the same time, storage vessels are usually thought to be more heavily tempered, but TRAP006-008 all are more heavily tempered than TRAP009 but have lots of fatty acids present. These results show that people at Traprain were cooking terrestrial ruminant meat at high temperatures for long periods of time. There are also traces of plant products too.

**6.1 Discussion**

- It was found that type of fabric or % of temper present does not alter the quantities of lipid preserved. Taphonomy, conservation or storage issues may have affected the residues preserved in the samples from Broxmouth, but did not affect those recovered from Traprain or Newmains. Broxmouth is situated on a limestone outcrop, which may be a factor affecting preservation.
- Additionally, the results show that the use and social role of pots were not linked to differences in fabric and form, and therefore that function was not predetermined by design. This undermines the applicability of a typology based on morphology and function.
- Furthermore, differences in fabric can be understood as personal preference of the potters, not linked to prescriptive predetermined ideas of typology linked to function. The significant implications of this are discussed further in Maxwell's thesis (forthcoming) linked to issues of access to resources (clay and temper), the household, and networks of engagement throughout the biographies of pottery.
- Overall, there is no mileage in attempting to create a typology based on pottery morphology and function for the East Lothian Iron Age, since despite a difference between finer and coarser fabrics, pottery was used similarly and differently

irrespective of this. Additionally, the major differences in how pottery was used did not occur over time but are site specific contemporaneously. Therefore comparing pottery between sites based on fabric and form without analysing their residues is highly problematic.

Unfortunately the residues at Broxmouth did not preserve well except in two examples (BROX 020 and BROX021); in which were residues from both plants and terrestrial meat.

The main finding is that people at Traprain Law were using pots differently to people at Newmains. This is interesting, since during the Late Iron Age of East Lothian both of these sites are understood to be high status and Romanised, but the residues from sherds from this period suggest the exploitation of varied local subsistence economies. At Newmains both plants and terrestrial meats were consumed, whereas at Traprain few plants were consumed and often there is only evidence for large quantities of terrestrial meats. Additionally, there is potential evidence for Roman imports at Newmains in the form of ricinoleic acid, although due to a lack of comparative data this is hard to contextualise.

The finding of ricinoleic acid in four out of seven of the Newmains samples is of particular interest (this was not specific to a particular fabric or form of pottery). This is the first time ricinoleic acid has been found in prehistoric pottery residues from Britain. Ricinoleic acid is characteristic of castor oil, but is also a known product of ergotism. Ergotism is unlikely due to the absence of its degradation product ergosterol despite the preservation of other alcohols in the samples such as cholesterol (Seitz et al 1977, Isaksson et al 2010: 3265). Castor oil was used in antiquity as an illuminant and is found as a residue on lamps (Columbini et al 2005 and Copley et al 2005) and was used as an embalming residue in Egypt (Tchapla et al 2004). Castor oil may also have been used as a food, for anointing (Plin.Nat.15: 7), and is also known for its medicinal properties for the skin and as a purgative (Pecci et al 2010). Castor oil is from a plant (*Ricinus communis*) which is widely grown in North Africa, and probably was grown there in late prehistory (ibid.: 619). Therefore this finding at Newmains potentially originated as a Roman import. However, if not castor oil, then the third possibility is that the ricinoleic acid derives from another processed plant which has not before been recognised in residue analysis studies.

## 7.1 Conclusion and Future Work

Further work is needed to contextualise the finding of ricinoleic acid in the Newmains samples through residue analysis of other assemblages, perhaps alongside experimental studies. The attempt to refine a typology for the pottery of East Lothian has proven problematic, since despite differences in coarse and fine morphologies of pottery, form and residue signatures are variable irrespective of this. Understanding developments in pottery use over time have also been out of reach, due to the lack of preservation of the Broxmouth residues. Direct thermoluminescence dating of the sherds from Newmains would help to further contextualise this site within the Iron Age of East Lothian. Importantly this project has added to our understanding of the varied site specific and complex biographies of pottery in the Iron Age of East Lothian. Although the findings suggest *ad hoc* making and exploitation of pottery, identities were expressed in how they were made and used. The residue-rich sherds from Traprain in particular suggest that pottery lived long biographies and was therefore valued. The difference between coarser and finer fabrics may be indicative of restricted access to particular clay and temper resources by certain individuals or households.

Archiving will be done as part of the Broxmouth Project, which will be deposited with the RCAHMS and form part of the online Canmore database. Advice on archiving standards have been received from RCAHMS already as part of the Broxmouth Project.

This program of analysis will contribute to the monograph due to be published in 2012 on Broxmouth Hillfort (section in Armit & McKenzie forthcoming with the applicant as lead author) and it is anticipated the forthcoming publication of the Traprain Law excavations will benefit from this additional research.

A paper on the finding of ricinoleic acid will be submitted to the journal Archaeometry, and it is hoped a note on this finding will be published in Archaeology Scotland to further the understanding of this unusual lipid in archaeological residue studies.

**Acknowledgements**

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| Analysis No | Analysis | Finds Code | Description | Type 1/ Type 2 | Final Context Code | Original Finds Location Description from Written Archive | Sampling/dating supporting evidence | RadioCarbon Dates of context | Drawn | Sample weight | Sampling NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **BROX 001** | 1 sample (rim) | EKX/ EKZ, ROUNDED & INTURNED | One rim and one body sherd rim with slight flattening in places and incurved. Coarsely tempered with black angular grits (5 to 15 mm in length), also some grass impressions in fabric. Ring built, fabric fired dark grey in core with black patched buff surfaces. Wall thickness:18 mm. | TYPE 1? (with thin black patchy layer) | JDL/JDM02 | HOUSE 4 Area 4: Phase 2 house; Midden T, behind Wall E, between walls JDL &JDM02 | 1st phase/ construction of House 4- we have dated this phase | 200-30BC & 200-40BC | DJB 2011 | 1.1893g | |
| **BROX 001 VR** | ISO encrustation sample (rim) | EKZ/ EK | SAME AS BROX 001 | TYPE 1? (with thin black patchy layer) | JDL/JDM02 | SAME AS BROX 001 | SAME AS BROX 001 | 200-30BC & 200-40BC | DJB 2011 | 0.0390g | Taken encrustation scraping from interior, top of rim & exterior rim. |
| **BROX 002** | 1 samples (Body) | EKZ/ EK | SAME AS BROX 001 | TYPE 1? (with thin black patchy layer) | JDL/JDM02 | SAME AS BROX 001 | SAME AS BROX 001 | 200-30BC & 200-40BC | BROXMOUTH ARCHIVE | 1.1820g +-0.0002g | |
| **BROX 003** | 1 sample (Base) | EMT | One base sherd; flat base and sloping out wall. Tempered with white and dark grits (up to c. 5 mm in length) with occasional larger ones. Coil built, fracture very uneven and knobbly. Fabric fired buff/orange on exterior and dark grey on interior surface. Base diameter c. 240mm, length 91mm, wall and base thickness:16 mm. | TYPE 3 (OR TYPE 1 Base?) | JIU04 | House 4 Area 4: Phase 2 house; Internal pit 2; 2/3 JIU04 | Is in a hearth. Was dated (Hill 1982). | 2045 + 105 BP uncal (Hill 1982) | BROXMOUTH ARCHIVE | 1.0218g | BASE SHERD FOR SAMPLING |
| **BROX 004** | 1 sample (Base) | GNT, FCX | A MACSWEEN 227 - 3 body sherds, 2 flat part of base, 1 rim, 1 fragment+A229. Three base and three body sherds flat base. Tempered with small dark and white grits (up to 2 mm in length) and some larger black and white crystalline grits (up to 10 mm in length) also some grass impressions in fabric. Fabric fired dark grey in core, buff on interior and black and buff with thin black patches on exterior surface. Also 1 rim sherd of very similar fabric but fired grey on interior possibly part of same vessel; rim is flat topped and has concave edge. Lengths 48m, 68mm, 71mm; wall thickness:14 mm. (Ill. ). | TYPE 2 | JDM/JDO | HOUSE 4 Area 4: Phase 2 house; midden W underlying Phase 5 Wall H, behind tumble of JDM forming extension of JDO | The additional rim sherd in description is not referred to in First draft of prehist. pott. report and cannot be found as separately catalogued. | 0-210AD cal (paving which corresponds to wall), 2050BP uncal (from JDO) | BROXMOUTH ARCHIVE | 1.2472g +- 0.0001g | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| **BROX 004 B** | Back-up | GNT, FCX | SAME AS BROX004 | SAME AS BROX004 | SAME AS BROX004 | SAME AS BROX004 | SAME AS BROX004 | SAME AS BROX004 | SAME AS BROX004 | 0.3754g | |
| **BROX 005** | 1 sample (Body) | GNT, FCX | SAME AS BROX 004 | TYPE 2 | JDM/JDO | SAME AS BROX 004 | SAME AS BROX 004 | SAME AS BROX 004 | BROXMOUTH ARCHIVE | 1.0161g | |
| **BROX 006** | 1 sample (exterior of base) | GNT, FCX | SAME AS BROX 004 | TYPE 2 | JDM/JDO | SAME AS BROX 004 | SAME AS BROX 004 | SAME AS BROX 004 | BROXMOUTH ARCHIVE | | TAKE SCRAPING FROM RIM (ISOTOPE) |
| **BROX 007** | 1 sample (Interior) | EHO | One body sherd. Tempered with small sandy grits (c.1 mm in length) and some large dark and black and white crystalline grits (up to 5 mm in length). Fabric fired dark grey in core, grey with buff patches on exterior and orange on interior surface. Wall thickness: 13 mm. | TYPE 2 | HCE | House 7 Area 7: Phase 3 roundhouse; behind Wall R, HCE | HCE is innermost wall of House 7 so this will represent penultimate phase. Likely to date context. In wall core. | 50BC-90AD & 40BC-130AD | BROXMOUTH ARCHIVE | 1.0050g | |
| **BROX 008** | 1 sample (Exterior) | EHO | One body sherd. Tempered with small sandy grits (c.1 mm in length) and some large dark and black and white crystalline grits (up to 5 mm in length). Fabric fired dark grey in core, grey with buff patches on exterior and orange on interior surface. Wall thickness: 13 mm. | TYPE 2 | HCE | House 7 Area 7: Phase 3 roundhouse; behind Wall R, HCE | HCE is innermost wall of House 7 so this will represent penultimate phase. Likely to date context. | 50BC-90AD & 40BC-130AD | BROXMOUTH ARCHIVE | | |
| **BROX 009** | 1 sample (Body) | FFJ | One body sherd with only one surface remaining. Tempered with black angular and black and white crystalline grits (up to 10 mm in length). Fabric fired buff/orange throughout. Wall thickness: 15+ mm. | TYPE 1 | HEK01 | Area 7: Phase 1 roundhouse, F 57 (group 2 feature), HEK01 | Described as shallow depression, poss. sinkage of paving into natural depression (context card). Located in centre of pre- | NO DATE | DJB 2011 | 1.0639g | |

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| **BROX 010** | 1 sample (Rim Interior) | DLX | *group:* Eight rim sherds and approximately twenty body sherds of bucket shaped vessel with markedly inturned, rounded rim and slightly concave wall above base. Coarsely tempered with black angular grits (10 to 15 mm.in length) and some smaller rounded pebbles (c.5 mm.in length), also one or two grass impressions in fabric.Ringbuilt. Fabric is fired to dark grey with buff/orange patches on outer surface especially towards base. Rim diameter:(approx)250 to 260 mm, wall thickness:17 mm. | TYPE 1 | CBJ | Area 10: main midden overlying Houses B, C and D, CBJ | 6 | 360BC-50BC | BROXMOUTH ARCHIVE | 0.9164g | |
| **BROX 011** | 1 sample (Rim Exterior) | DLX | SAME AS BROX 010 | TYPE 1 | CBJ | SAME AS BROX 010 | 6 | 360BC-50BC | BROXMOUTH ARCHIVE | | |
| **BROX 012** | 1 sample (Body) | ELN | SAME AS BROX 010 | TYPE 1 | CBJ | SAME AS BROX 010 | 6 | 360BC-50BC | BROXMOUTH ARCHIVE | 1.1001g | |
| **BROX 012 VR** | Encrustation ISO | ELN | *SAME AS BROX 010* | TYPE 1 | CBJ | *SAME AS BROX 010* | 6 | 360BC-50BC | BROXMOUTH ARCHIVE | 0.1417g | |
| **BROX 013** | 1 sample (body), take scrapings | FIP | *Sherd in group:* Two rim sherds, approximately ninety body sherds and many small fragments of a bucketshaped vessel with rounded rim.(Ill. ) Coarsely tempered with angular black,black and white crystalline and red sandy grits (10 to 25 mm in length), also many grass impressions in fabric. Ringbuilt. Fabric fired dark grey in interior, buff/orange on exterior with grey zone by rim. Surfaces very uneven and show grass impressions. Rim diameter:340 mm, wall thickness: 26mm. | N/A | BBC | Period VI, S ENT, Middle Ditch E Terminal. Unstratified, Basal midden; laminated midden and weathered materials; middle layer, weathered fill (VI/Q/U/S,3;4; | 29 | 400BC-200BC | DJB 2011 | 1.0744g +- 0.0003g | |

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| **BROX 013 VR** | 1 sample (body), take scrapings | FIP | *SAME AS BROX 013* | *SAME AS BROX 013* | *SAME AS BROX 013* | *SAME AS BROX 013* | *SAME AS BROX 013* | 400BC-200BC | DJB 2011 | 0.1751g | Encrustation taken from 3 body sherds of FIP. |
| **BROX 014** | 1 sample (rim) | FNX, 3 conjoined body sherds and 6 conjoined rim and body sherds with NO CODE | SAME AS BROX 013 | N/A | BBC | SAME AS BROX 013 | 29 | 400BC-200BC | DJB 2011 | 1.0713g +- 0.0001g | |
| **BROX 015** | 1 sample (Base) | CJF | *Sherd in group:* Three rims,one base sherd and twenty body sherds of bucket shaped vessel with rounded inturned rim and flat base; some vertical finger ribbing near rim(Ill. ). Tempered with dark and white grits (up to 2 mm in length) with occasional larger black angular grits (up to 6 mm in length); also many grass impressions one of which was identified as barley. Fabric fired dark grey in core with orange surfaces, external surface has thin black patches, both surfaces have grass impressions. Rim diameter: (approx)240 mm., wall thickness:13 mm. (N.B.The majority of the sherds do not join and there are slight differences between them and more than one vessel may be Represented). | TYPE 1 | N/A | Period VIII: Rubble infill of Period VII roadway of S ENT, post machine clearance | 61 | NO SPECIFIC CONTEXT GIVEN | DJB 2011 | 0.9736g | Sherds of similar fabric, thickness and form chosen, possible from same vessel. |
| **BROX 016** | 1 sample (Body) | DOX | SAME AS BROX 015 | TYPE 1 | N/A | SAME AS BROX 015 | 61 | NO SPECIFIC CONTEXT GIVEN | BROXMOUTH ARCHIVE | 1.1890g | Sherds of similar fabric, thickness and form chosen, possible from same vessel. |
| **BROX 016 B** | 1 sample (Body) | DOX | SAME AS BROX 015 | SAME AS BROX 015 | SAME AS BROX 015 | SAME AS BROX 015 | 61 | NO SPECIFIC CONTEXT GIVEN | BROXMOUTH ARCHIVE | 0.3220g | Back-up |

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| **BROX 017** | 1 sample (rim) | CYU | SAME AS BROX 015 | TYPE 1 | N/A | SAME AS BROX 015 | 61 | NO SPECIFIC CONTEXT GIVEN | BROXMOUTH ARCHIVE | 1.0186g | Sherds of similar fabric, thickness and form chosen, possible from same vessel. |
| **BROX 017 B** | 1 sample (rim) | CYU | SAME AS BROX 015 | SAME AS BROX 015 | SAME AS BROX 015 | SAME AS BROX 015 | 61 | NO SPECIFIC CONTEXT GIVEN | BROXMOUTH ARCHIVE | 0.6459g | Back-up |
| **BROX 018** | 1 sample (SAMIAN) | CMC | Dragendorff form 37, Central Gaulish. The lower part of the decoration just survives at one point, and shows edge impressions of a leaf. This was common practice amongst Antonine potters. The fabric and quality suggest an early Antonine date. Base and edges deliberately chipped. 77Mm x 38mm x 19mm. Weight: 42.86g. | SAMIAN | HAB02 | Area 7: Phase 4; rubble infill (X) of abandoned house, 1st cleaning, HAB02 | 141 | 2005±60 BP uncal (Hill 1982) | BROXMOUTH ARCHIVE | 0.9908g | |
| **BROX 019** | Encrustation ISO | EMN | SAME AS BROX 010 | TYPE 1 | CBJ | SAME AS BROX 010 | 6 | 360BC-50BC | BROXMOUTH ARCHIVE | 0.0157g | |
| **JUNE ANALYSIS** | | | | | | | | | | | |
| **BROX 020** | Rim, ROUNDED & INTURNED | ELN | *group:* Eight rim sherds and approximately twenty body sherds of bucket shaped vessel with markedly inturned, rounded rim and slightly concave wall above base. Coarsely tempered with black angular grits (10 to 15 mm.in length) and some smaller rounded pebbles (c.5 mm.in length), also one or two grass impressions in fabric.Ringbuilt. Fabric is fired to dark grey with buff/orange patches on outer surface especially towards base. Rim diameter (approx)250 to 260 mm, wall | TYPE 1 | CBJ | Area 10: main midden overlying Houses B, C and D, CBJ | | 360BC-50BC | BROXMOUTH ARCHIVE | 2.1108g | |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| **BROX 021** | Rim, FLAT & CONCAVE | FCX | SAME AS BROX 004: A MACSWEEN 227 - 3 body sherds, 2 flat part of base, 1 rim, 1 fragment=A229. Three base and three body sherds flat base. Tempered with small dark and white grits (up to 2 mm in length) and some larger black and white crystalline grits (up to 10 mm in length) also some grass impressions in fabric. Fabric fired dark grey in core, buff on interior and black and buff with thin black patches on exterior surface. Also 1 rim sherd of very similar fabric but fired grey on interior possibly part of same vessel; rim is flat topped and has concave edge. Lengths 48m, 68mm, 71mm; wall thickness:14 mm. (Ill...) | TYPE 2 | NOT GIVEN (wall H) | SAME AS BROX 004 | | 0-210AD cal (paving which corresponds to wall), 2050BP uncal (from JDO) | BROXMOUTH ARCHIVE | 1.8926g | Very slightly inturned flat rim. |
| **TRAP 001** | Rim, PLAIN | sf.504 | 70% ang (b & w) 2C RIM | | TRENCH C C020 | | | | NMS | 2.1042g | VR taken from interior 0.1429g |
| **TRAP 002** | Rim, PLAIN | sf. 415 | 70% ang (b & w) 2C RIM | | TRENCH C C004 | | | | NMS | 1.9487g | VR taken from interior 0.1862g |
| **NEW 001** | Rim, ROUNDED & OUTURNED | 265 | Rim sherd. Rounded inturned rim profile. Both surfaces intact. Fired black in core and buff/orange on surfaces. Black encrustation and sooting on outer surface under rim. Both surfaces smoothed. Very frequent black, and mauve micacious sub-angular micacious inclusions up to 4mm. Wall thickness: 13mm. Rim Diam: 105mm | | AREA B | | | | DJB 2011 | 2.2903g | VR taken from interior 0.0226g |
| **NEW 002** | Rim, ROUNDED & OUTURNED | 175 | Rim sherd, curved rounded out-turned rim, making slight lip. Incision under rim on outer surface, decoration. Core and interior fired black with buff/ orange exterior. Black encrustation all over interior surface. Frequent, many medium sized, black, white and mauve inclusions 1-4mm, occasional micacious. Wall thickness=13mm, Rim Diam.?mm not enough remaining to determine. | | AREA A | | | | DJB 2011 | 2.2018g | VR taken from interior 0.1997g |
| **BLANK** | | | | | | | | | | 1.0024g | |
| **SEPTEMBER ANALYSIS** | | | | | | | | | | | |
| **NEW003** | Rim, ROUNDED & INTURNED | 147 | Rim sherd. Rounded inturned rim profile. Both surfaces intact. Fired buff/grey throughout with orange patches on surfaces. Black encrustation on outer surface. Exterior surface smoothed. Finegrained, micacious,very frequent black, and mauve micacious inclusions less than 1mm. Wall thickness: 10mm. Rim Diam: 97mm | | AREA A | | | | DJB 2011 | 2.0846g | FAILED |
| **NEW004** | Rim, ROUNDED & INTURNED | 150 | Rim sherd. Irregular rounded inturned rim profile. Both surfaces intact. Fired buff/grey throughout with orange and black patches on surfaces. Black encrustation on outer surface. Both surfaces smoothed. Finegrained, micacious,very frequent black, and mauve micacious inclusions up to 2mm. Wall thickness: 10mm. Rim Diam: c.63mm | | AREA A | | | | DJB 2011 | 1.9602g | FAILED |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| **NEW005** | Body, 2 joined sherds | 199 | 2 joining body sherds. Both surfaces intact. Core fired black with orange/buff exterior and black interior. Patches of shiny black residue on interior. Coil built, broken at coil. Frequent small black and white grit micacious angular inclusions, up to 1mm and occasional black angular inclusion up to 3mm. Wall thickness: | | AREA A | | | | NO | 2.0820g | FAILED |
| **NEW006** | Rim, ROUNDED, 2 joined sherds | 212 | 2 joining rim/ body sherds. Rim is rounded in profile. Both surfaces intact. Exterior surface roughly smoothed. Core fired black with buff/ orange exterior and patch of black. Frequent large and small black, mauve and white grit micacious angular inclusions, up to 5mm. Wall thickness: 11mm. | | AREA A | | | | DJB 2011 | 2.0462g | FAILED |
| **NEW007** | Rim, ROUNDED, SLIGHTLY OUTURNED | 245 | Rim sherd. Rounded very slightly outturned rim profile. Both surfaces surviving. Core fired black and buff towards interior. Outer surface is fired black and is cracked. Frequent black, white and mauve sub-angular micacious inclusions up to 1mm. Wall thickness: 14mm. Same as 266? | | AREA B | | | | DJB 2011 | 1.9292g | FAILED, Back-up was taken |
| **NEW008** | Body | 258 | Body sherd. Both surfaces intact. Core fired black and patchy black and buff on outer surfaces. Micacious, with frequent black, red and white sub- angular inclusions less than 1mm long, and occasional black and white sub-angular grit inclusions up to 5mm long. Grass/ straw temper has been used in fabric. Area of black encrustation on interior surface. Wall thickness: 14mm-18mm. Same as | | AREA B | | | | NO | 2.1962g | FAILED |
| **NEW009** | Rim, 2 joining sherds, ROUNDED & INTURNED | 261 | 2 joining rim/ body sherds. Rim is rounded and slightly inturned in profile. Both surfaces intact. Both surfaces smoothed. Core fired black with buff/ orange surfaces and patches of black sooting and encrustation on exterior. Frequent large and small black, mauve and white grit micacious angular inclusions, up to 5mm. Wall thickness: 11mm. Rim diam: c.120mm. | | AREA B | | | | DJB 2011 | 2.0369g | FAILED |
| **NEW010** | Rim, ROUNDED & UPRIGHT | 266 | Rim sherd. Rounded rim profile. Both surfaces intact. Fired black in core and buff/orange on surfaces. Black encrustation and sooting on outer surface under rim. Both surfaces smoothed. Very frequent black, and mauve micacious sub-angular micacious inclusions up to 4mm. Wall thickness: 13mm. Rim Diam: | | AREA B | | | | DJB 2011 | 1.9189g | FAILED |
| **BLANK** | | | | | | | | | | 1.0231g | FAILED |
| **NEW011** | Body, 3 joining sherds BACK-UP | 198 | 3 conjoining body sherds. Core fired grey/ black with buff/orange exteriors, and black patches on interior. Part of barrel shaped vessel. Fabric impression on interior, from smoothing? Grass impression on interior. Coil built. Very frequent small black angular grit inclusions 1-2mm, and occasional larger ones in core up to 6mm. Micacious fabric. Wall thickness: 16mm | | AREA A | | | | NO | 2.2148g | Drilled for re-run of Newmains samples |
| **NEW012** | Same as above | 199 | Same as above | | AREA A | | | | NO | 2.3542g | Re-run, Re-drilled |
| **NEW013** | Same as above | 212 | Same as above | | AREA A | | | | SAME AS NEW006 | 2.4305g | Re-run, Re-drilled |